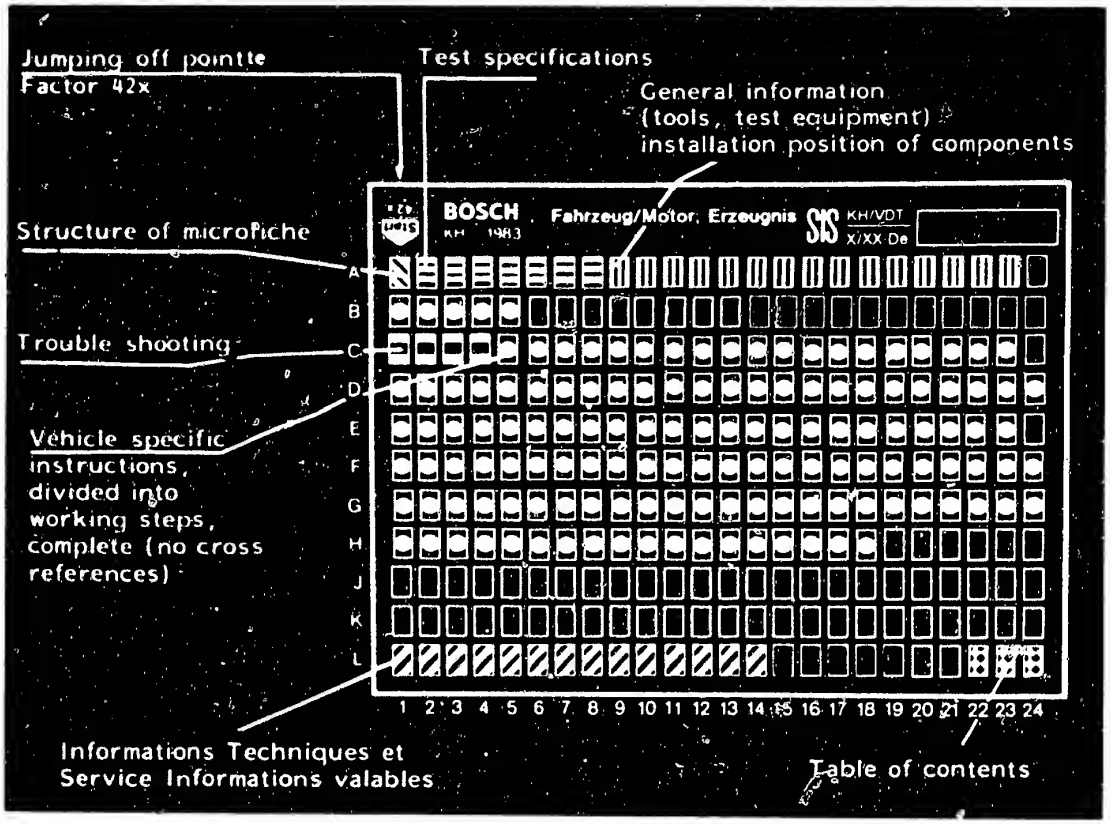
Structure of microfiche



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E 16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning | Mid-section | End | One-page section

4. Purely vehicle-related passages identified by a vertical bar.

5. References to relevant test steps in test specifications; coordinate e.g. C6

C6

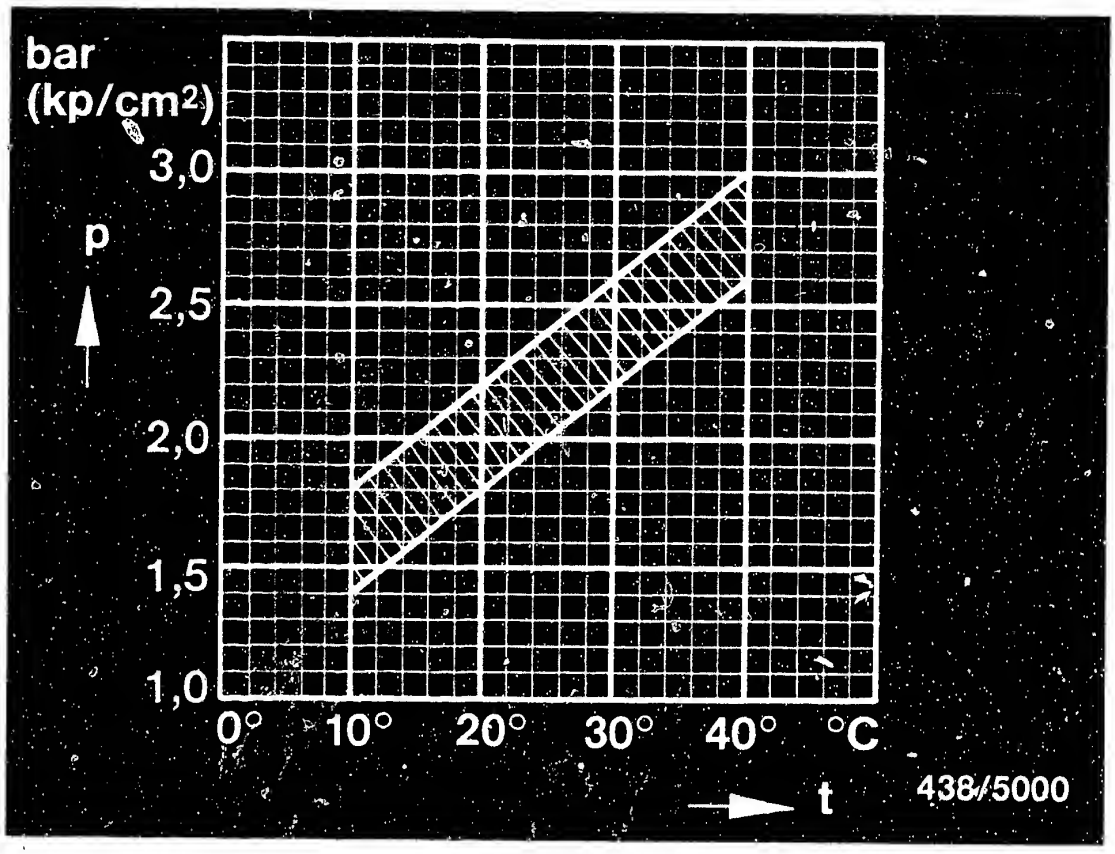
A1	Trouble-shooting program	⬇

1. Test specifications

1.1 Electric fuel pump

D1

Test step	Test specifications
Fuel delivery:	min. 850 cm^3/30 s

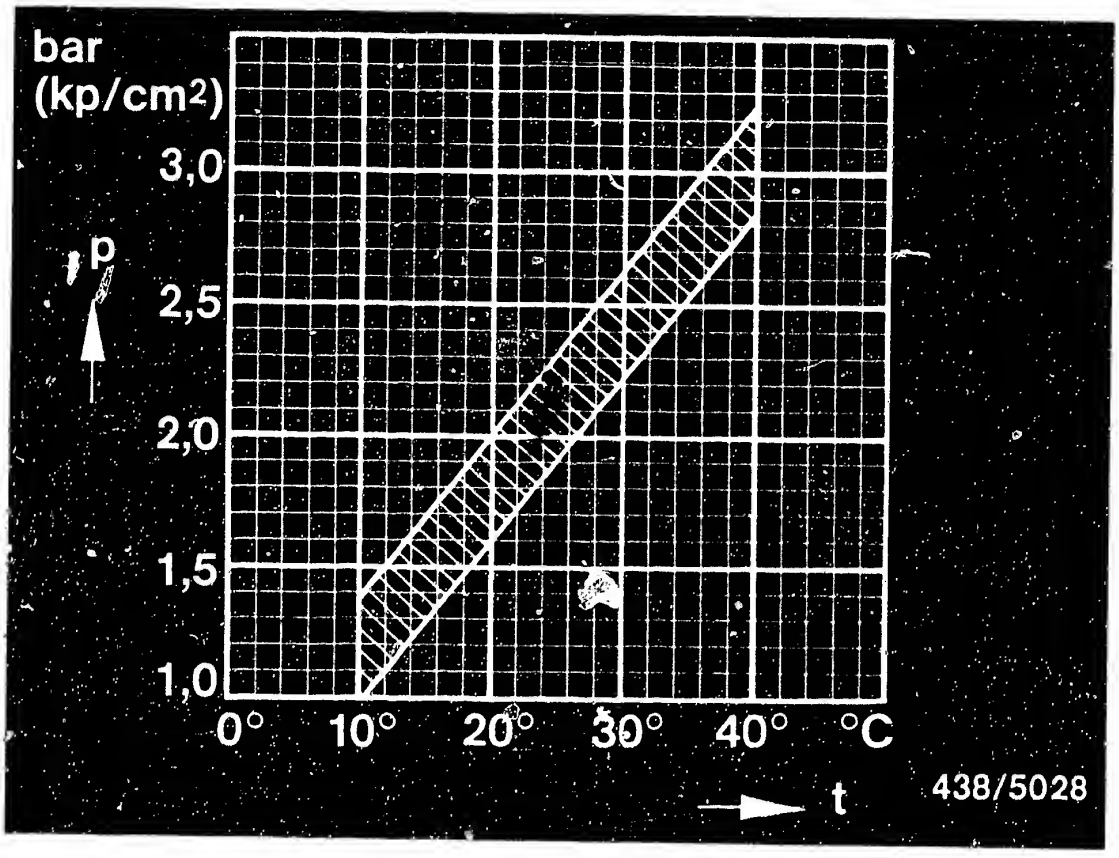


p = Control pressure (gauge pressure)
t = Ambient temperature

1.2 Control pressure "cold"

D13

- Warm-up regulator part number: 0 438 140 001
  (911.. 1.73-1.74)

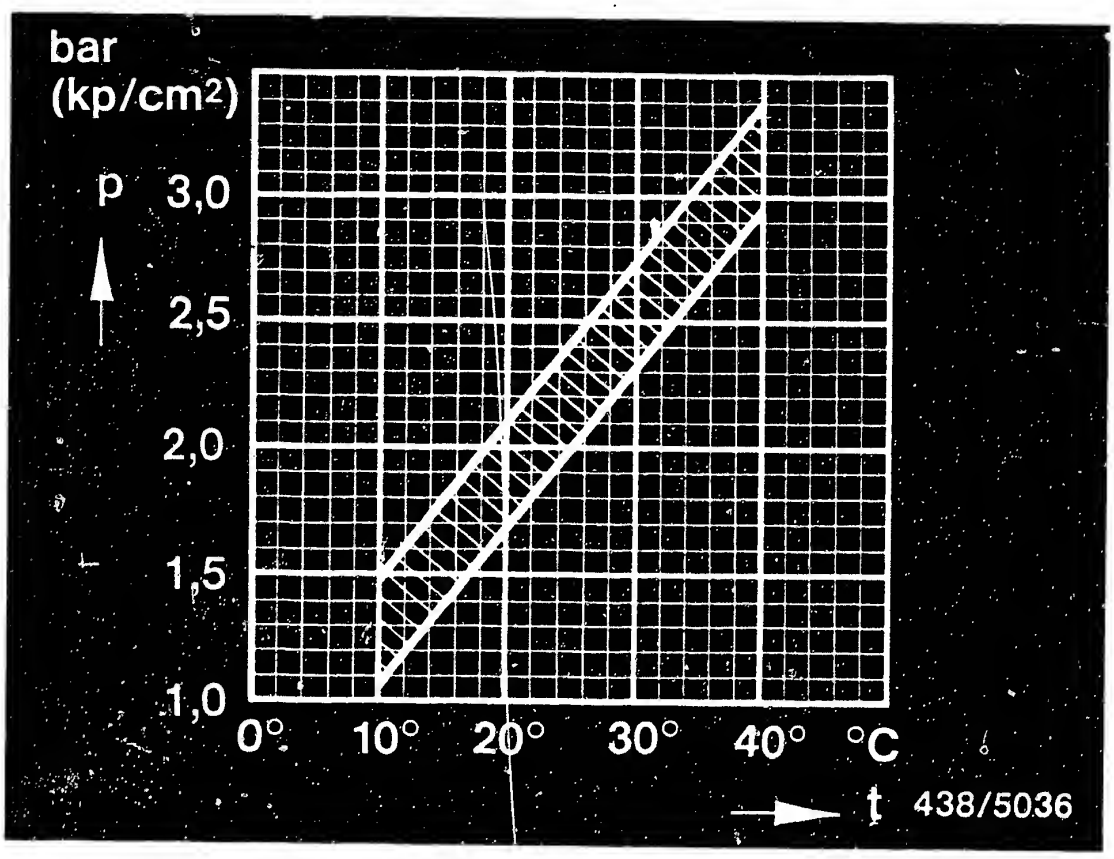


p = Control pressure (gauge pressure)
t = Ambient temperature

D 13

Control pressure "cold"

- Warm-up regulator part number: 0 438 140 008
  (911... 2.74-8.75)



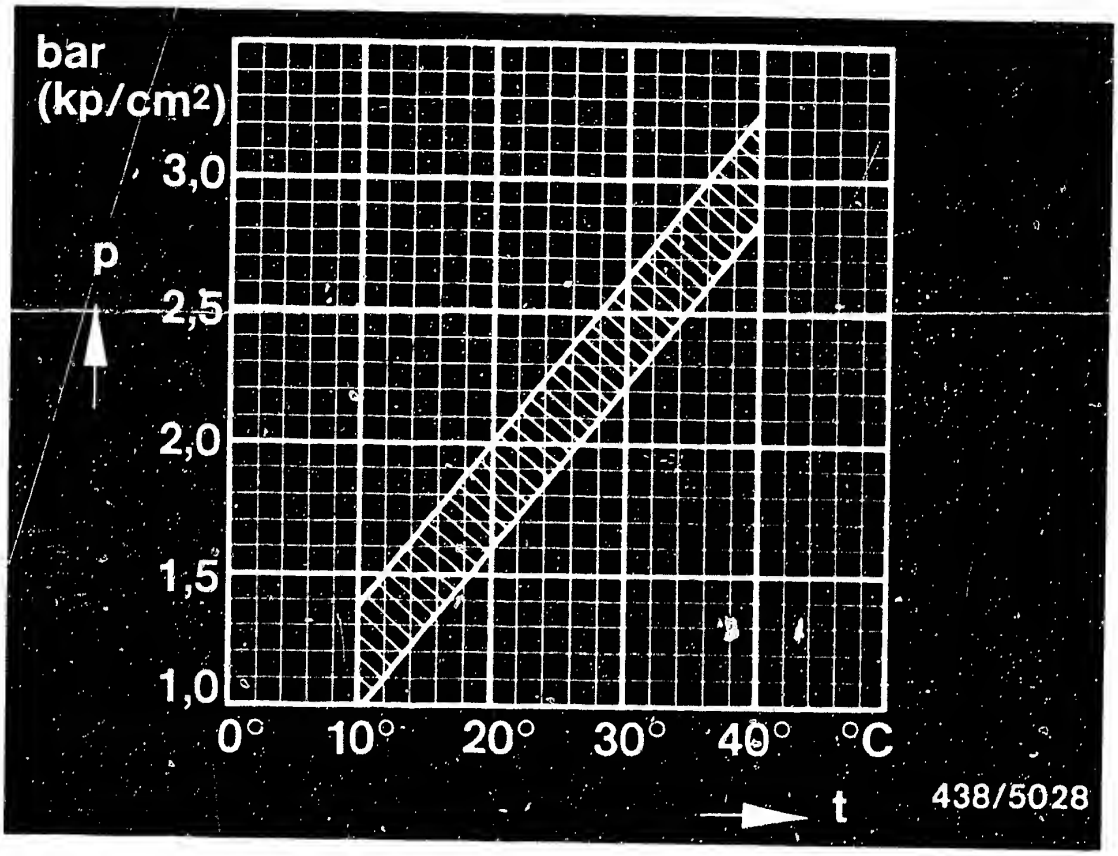
p = Control pressure
t = Ambient temperature

Control pressure "cold"

D13

Warm-up regulator part number: 0 438 140 129

(Replacement version for the no longer available warm-up regulators 0 438 140 001 and 0 438 140 008).



p = Control pressure (gauge pressure)
t = Ambient temperature

Control pressure "cold"

D 13

Part No. of warm-up regulator: 0 438 140 009

(Version for intake-manifold-pressure-controlled full-load enrichment).

For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.

Setting value: 520...546 mbar
(390...410 mmHg)

1.3 Control pressure "warm"

a) Vehicles with warm-up regulator 0 438 140 001 and ..008 and throttle-actuated valve:

E16

Test with engine stopped.

Control pressure "warm" according to position of throttle valve:

• Idle, checking value:	2.8 ... 3.0 bar	(2.9 ... 3.1 kgf/cm²)
setting value:	2.85... 2.95 bar	(2.95... 3.05 kgf/cm²)
• Part load:	3.25... 3.65 bar	(3.35... 3.75 kgf/cm²)
• Full load:	2.6 ... 3.0 bar	(2.7 ... 3.1 kgf/cm²)

Note: The part-load value is determined by the warm-up regulator; the idle and full-load values are determined by the throttle-actuated valve.
The idle value can be adjusted by turning the throttle-actuated valve in the area of the slots.

Pressures in the test-specifications are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

b) Vehicles with warm-up regulator 0 438 140 129 (replacement version for the no longer available warm-up regulators 0 438 140 001 and 0 438 140 008) and throttle-actuated valve:

Test with engine stopped.

Control pressure "warm" according to position of throttle valve:

- Idle, checking value: 2.8 ... 3.0 bar (2.9 ... 3.1 kgf/cm²)
  setting value: 2.85... 2.95 bar (2.95... 3.05 kgf/cm²)
- Part load: 3.25... 3.65 bar (3.35... 3.75 kgf/cm²)
- Full load: 2.6 ... 3.0 bar (2.7 ... 3.1 kgf/cm²)

Note: The part-load value is determined by the warm-up regulator; the idle and full-load values are determined by the throttle-actuated valve.
The idle value can be adjusted by turning the throttle-actuated valve in the area of the slots.

Pressures in the test-specifications are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

Control pressure "warm" (continued)

c) Vehicles with warm-up regulator version 0 438 140 009 (version for manifold-pressure-controlled full-load enrichment), without throttle-actuated valve:

- Test with atmospheric pressure (without vacuum)
  2.7 ... 3.1 bar
  (2.8 ... 3.2 kgf/cm²)

- For testing, connect vacuum pump to intake-manifold connection of warm-up regulator:

  Setting value:
  520...546 mbar
  (390...410 mmHg)

  3.4 ... 3.8 bar
  (3.5 ... 3.9 kgf/cm²)

- Leak test on full-load diaphragm:

  Max. pressure drop:
  from "setting value": 100 mbar (75 mmHg) / 15 s

Pressures in the test-specifications are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

Test step	Test specifications *

F6

1.4 Primary pressure
(Fuel distributor: 0 438 100 004, 006

Checking value:	4,5...5,2 bar (4,6...5,3 kgf/cm²)
Setting value:	4,7...4,9 bar (4,8...5,0 kgf/cm²)

F14

1.5 Leak test
(Fuel accumulator: 0 438 170 002)

Minimum pressure	
after 10 minutes:	1,3 bar (1,4 kgf/cm²)
after 20 minutes:	1,1 bar (1,2 kgf/cm²)

G9

1.6 Injection valves
(0 437 502 022)

Opening pressure: 2,5...3,6 bar
(2,6...3,7 kgf/cm²)

G20

1.7 Fuel distributor

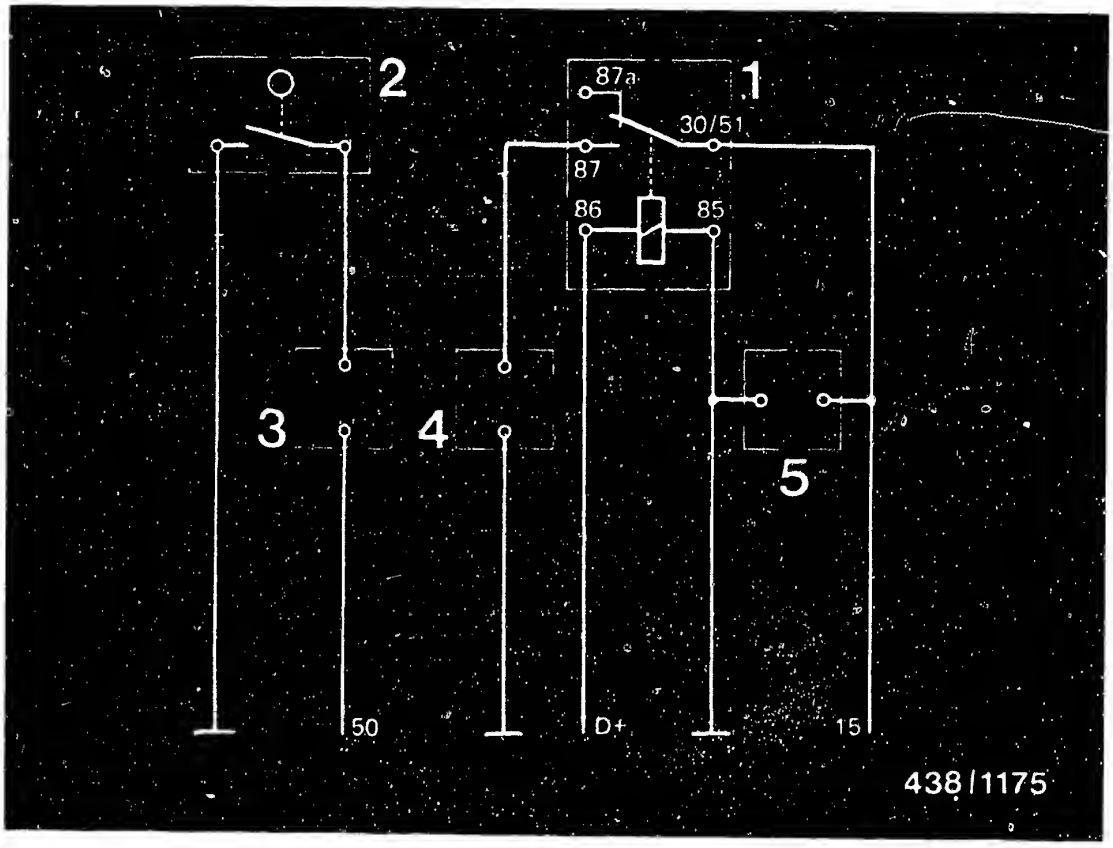
0 438 100 120

Comparative measurement of fuel delivery from outlets:	Setting point	Max. allowable delivery
Idle	6.0 cm³/min	6.8 cm³/min
Part load	40.0 cm³/min	44.0 cm³/min
Full load	160,0 cm³/min	175,0 cm³/min

1.8 Idle adjustment:

Idle speed:	850 ... 950 min^{-1}	(manually-shifted transmission)
	900 ...1000 min^{-1}	(Sportomatic)
CO concentration (% by vol.)	73/74 model	1.5 ... 2.0 %
	75 model general	2.0 ... 2.5 %
	USA	1.5 ... 2.0 % *

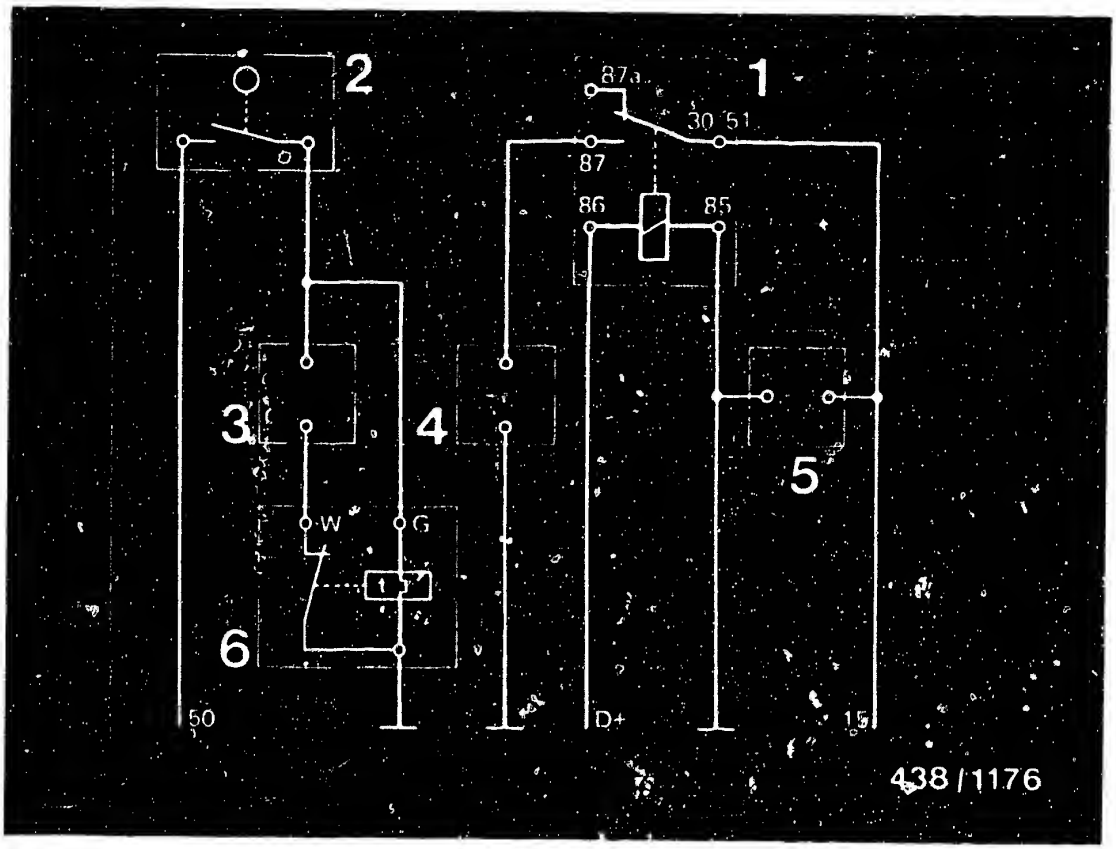
* Note: Pressure hose disconnected from secondary-air pump and sealed off tight.



1 = Relay
2 = Throttle-valve switch
3 = Start valve
4 = Warm-up regulator
5 = Electric fuel pump

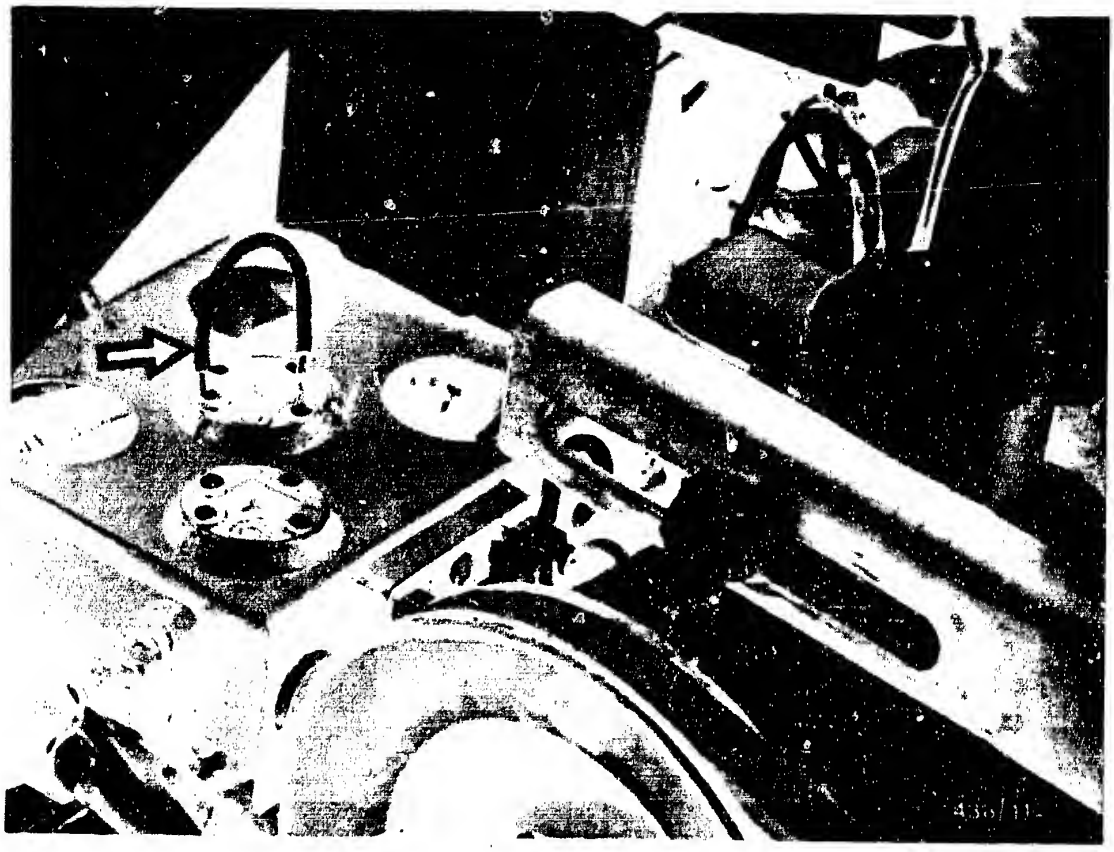
2. Electrical safety circuit

2.1 model 911 T (2.4 l), 1.73 - 7.73



1 = Relay
2 = Throttle-valve switch
3 = Start valve
4 = Warm-up regulator
5 = Electric fuel pump
6 = Thermo-time switch

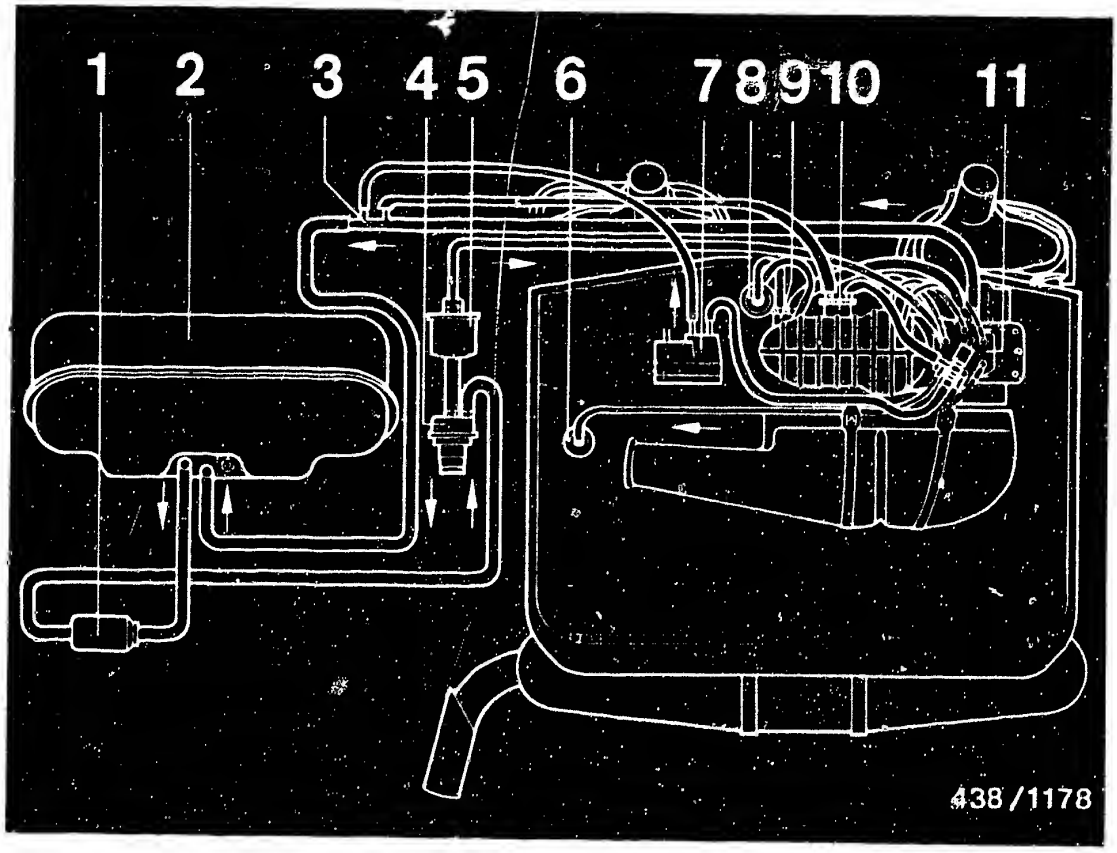
2.2 model 911, 911 S (2.7 l), 8.73 ... 8.75



In order to carry out the "warm" control-pressure test with the engine stopped, bridge the control relay for the warm-up regulator.

To do this, remove relay from panel and bridge sockets 30/51 and 87 using a cable (arrow).

Note:
There are two relays on the panel. Establish which relay is for the warm-up regulator since its installation position is not always the same.



3. Diagram of fuel lines

1 - Electric fuel pump
2 - Fuel tank
3 - Connection piece for fuel return lines
4 - Fuel accumulator
5 - Fuel filter
6 - Injection valve (s)
7 - Warm-up regulator
8 - Vacuum limiter
9 - Start valve
10- Throttle-actuated valve
11- Mixture-control unit

4. General information

4.1 Introduction:

This repair instruction manual deals with the following Porsche vehicle models with K-Jetronic:

911 T with 2.4 l engine, 1.73 ... 7.73 (USA model)

911,911 S with 2.7 l engine, 8.73...8.75 (worldwide)

All the system components are dealt with in separate working steps with the corresponding test specifications.

In addition to this repair manual the appropriate testing and repair manuals will, of course, be issued for every other vehicle type equipped with the K-Jetronic.

The K-Jetronic differs from other known fuel-injection systems in terms of both construction and operation. In order to be able to carry out the testing procedures described in this manual - and therefore to be able to assess the components - the K-Jetronic and its operation should be clearly understood. The essential points of the operation and construction of the K-Jetronic are described in Technical Instruction VDT-U 3/1 En.

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 2 - B 5 is intended to make it easier to decide which test steps have to be carried out for certain faults.

According to the symptom stated by the customer or which you yourself have determined, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:

If any fuel connections are loosened, parts removed, also on the vacuum system, always use new seals when re-connecting or re-installing.

Ensure utmost cleanliness when working on the K-Jetronic. Fuel connections must be cleaned thoroughly on the outside before opening.

4.2 Design of K-Jetronic:

The entire system of the K-Jetronic in these vehicle models corresponds, with the exception of the differences listed below, to the basic design as described in Technical Instruction VDT-U 3/1 En.

The following components are different or extra:

- The 73 and 74 models were equipped with a throttle-actuated valve for load-dependent control-pressure correction. As of the 75 model, the USA models were supplied without throttle-actuated valve, and the other versions worldwide were supplied with throttle-actuated valve.

  Operation of throttle-actuated valve:

  The throttle-actuated valve is connected hydraulically in parallel with the warm-up regulator. It is mounted on the throttle-valve assembly by two screws and is actuated by the throttle shaft. The internal valve insert is the same as that of the warm-up regulator.

  In the valve housing there is a disc cam which is turned by the throttle shaft. The valve spring lies by way of a ball on the path of the cam. Thus, depending on the throttle position, there is a change of the valve spring preload, and this results in a change of pressure.

  The path of the cam is designed so that there are the following pressures:

  idle = approx. 2.9 bar
  part load = approx. 4.1 bar
  full load = approx. 2.8 bar

The parallel connection of the throttle-actuated valve with the warm-up regulator means that in the control-pressure circuit there is always a pressure which corresponds to the lowest-set pressure regulator:

"cold" control pressure (below 2.5 bar): determined by warm-up regulator

"warm" control pressure (above 2.5 bar): determined
at idle: by throttle-actuated valve
at part load: by warm-up regulator
at full load: by throttle-actuated valve

The idle value is adjustable by turning the throttle-actuated valve in the area of the slots.

- Warm-up regulator: All models equipped with throttle-actuated valve have the basic version of warm-up regulator, i. e. apart from the basic functions (control pressure warm and cold) it has no further functions.

  The warm-up regulator of the 75-USA model (without throttle-actuated valve) is a version for manifold-pressure-controlled full-load enrichment.

  The warm-up regulators 0 438 140 001 and .. 008 are versions with fixed tailpieces and are no longer available. The replacement is warm-up regulator 0 438 140 129 which is equipped with corresponding screw-in tailpieces.

- Auxiliary-air device: The 911, 911 T and 911 S were supplied without auxiliary-air device up to and including the 74 model. With the engine cold, the engine speed is stabilized by hand using the manual-throttle lever between the seats.

- Fuel distributor: Fuel distributor 0 438 100 004 is a version with fixed tailpieces and is no longer available. The replacement is fuel distributor 0 438 100 017. To install the replacement fuel distributor, the installation kit (screw-in tailpieces) 2 437 011 001 is additionally required.

4.3 Electrical safety circuit

- The electric fuel pump is connected directly to terminal 15 and ground in these Porsche models.

- The warm-up regulator is energized by a relay whose coil is connected to ground and to generator, terminal D+. The warm-up regulator cannot, therefore, begin to shut off until the engine is running, i.e. until there is positive potential at terminal D+.

- The cold-start system of the 911 T model does not contain a thermo-time switch. The start valve is connected to positive directly through terminal 50. The ground connection is through a throttle-valve switch which is open with the throttle closed. As of approx. 5° throttle opening, the switch is closed, i.e. only with the throttle open can the start valve inject when starting.

In the 911 and 911 S models there is additionally a thermo-time switch. In this case, the positive connection for the start valve is through the throttle-valve switch, and the ground connection is through the thermo-time switch.

4.4 Other equipment:

- All the models dealt with here are equipped with a vacuum limiter. This is a vacuum-controlled auxiliary-air device in the bypass around the throttle valve. The vacuum limiter opens only on the overrun. In all other operating conditions the vacuum limiter must be closed and sealed tight.

- To obtain low emission values, the USA vehicles as of the 75 model are equipped with secondary-air injection. The secondary air is fed into the exhaust ports after the exhaust valves by an engine-driven air pump by way of a non-return valve and a distributor line. In the pressure line there is also a manifold-pressure-controlled blow-off valve. At full load the valve switches and the secondary air is directed into the atmosphere.

  Note: To make the idle adjustment (CO adjustment) it is necessary to render the secondary-air injection system inoperative. To do this, disconnect the pressure line of the air pump and seal off tight.

5. Test equipment and tools

- Pressure tester KDJE-P 100 (previously KDEP 1034).
  For testing all fuel pressures and testing for leaks.

- Connecting-parts set KDJE-P 100/12 (previously KDEP 1034/12).
  For connecting pressure tester to the control-pressure port of the fuel distributor.

- Adjusting wrench KDEP 1035.
  For adjusting the idle-mixture-adjusting screw in the mixture-control unit (CO-adjustment).

- Guide ring KDEP 1040/13 (85 mm dia.)
  For centering the air-flow sensor plate. Used on model 911 T, 1.73...7.73.

- Guide ring KDEP 1040/10 (80 mm dia.)
  As above, but for models 911 and 911 S, as of 8.73.

- Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).
  For comparing the fuel delivered from the individual fuel-distributor outlets.

- Graduate (commercially available, capacity approx. 1.5 l)
  For measuring the delivery of the electric fuel pump.

- Electric connecting cable (test lead).
  KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.

- Set of tools for the removal and fitting of idle-CO-anti-tamper device of air-flow sensor.
  (e.g. No. 131090 from the firm Cartool, Hans Schubert KG, Unterer Grasweg 88/D-8070 Ingolstadt).

- Valve tester KDJE-P 400 (previously KDJE 7452).
  For testing the injection valves.

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135) or
Bosch order designation VS 14 942-CH
previously part number 5 973 340 650
The Bosch calibrating fluid can be obtained in 5 l metal cans from the following supplier:
Firma
Oskar Gnamm GmbH & Co
D-7531 Kämpfelbach-Bilfingen

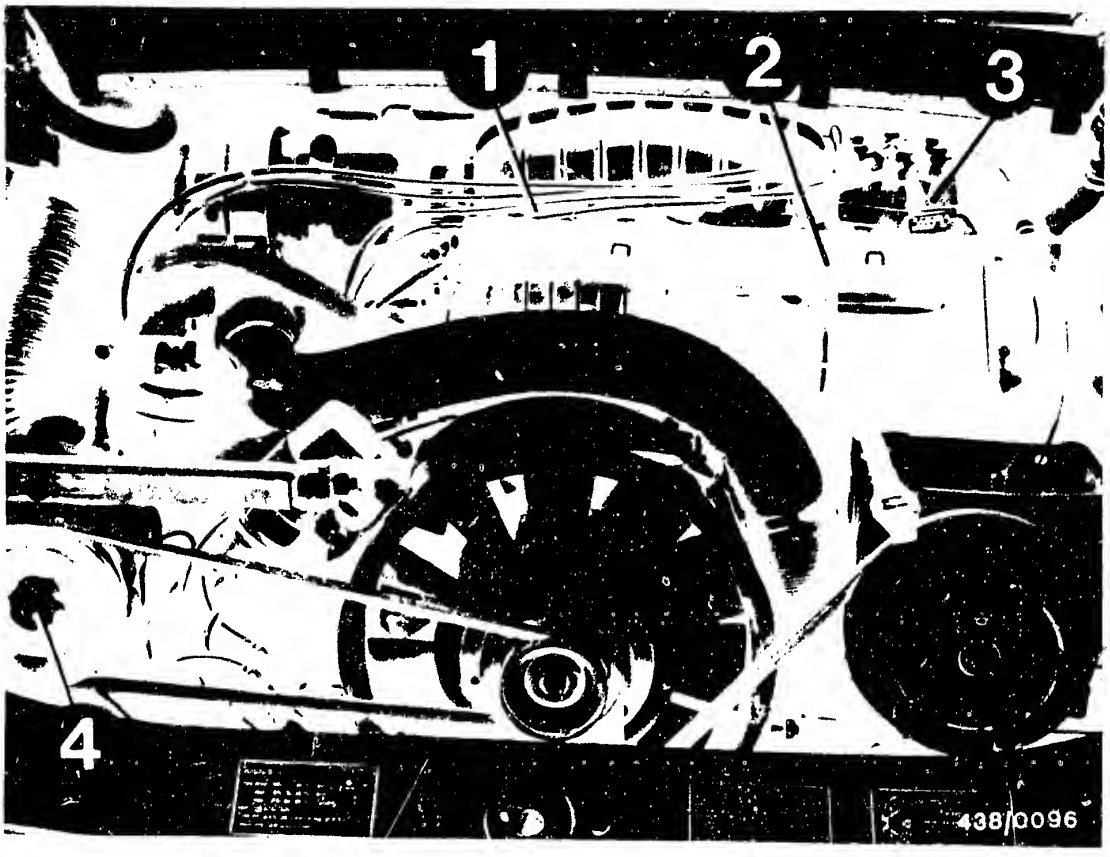
Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids. Even with calibrating fluid, be sure to observe the local official regulations.

- Tachometer (commercially available).
  For idle-speed adjustment.

- CO meter (commercially available).
  For idle-speed CO adjustment.

- Vacuum pump (commercially available).
  For testing warm-up regulators with intake-manifold-pressure-dependent full-load enrichment.
  e.g. Hand vacuum pump "Mityvac" from
  Firma Korinth
  Ludwig-Kloos-Straße 21
  6450 Hanau 7 (Steinheim)

- Assembly tool KDEP 1039
  For mounting the polyamide hose lines on components with fixed tailpieces (fuel distributor, warm-up regulator, throttle-actuated valve).

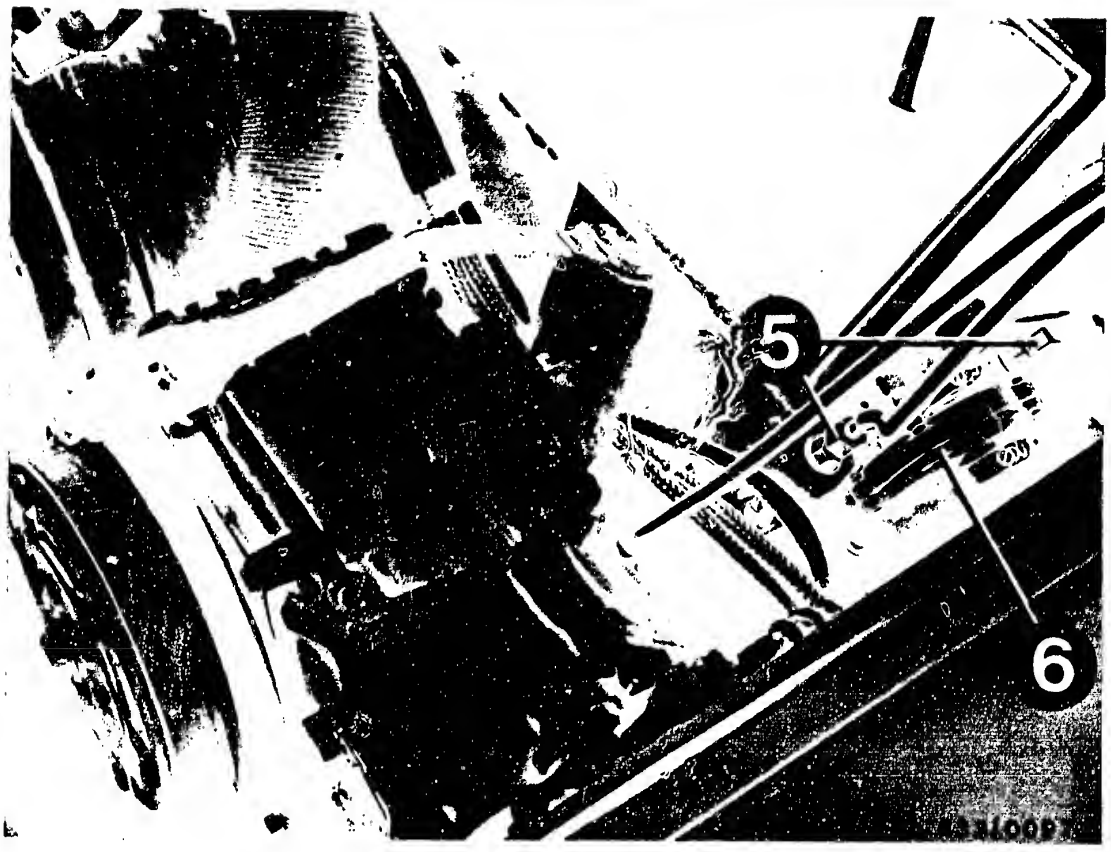


1 = Throttle-valve assembly
2 = Intake housing
3 = Mixture-control unit (air filter removed)
4 = Secondary-air pump

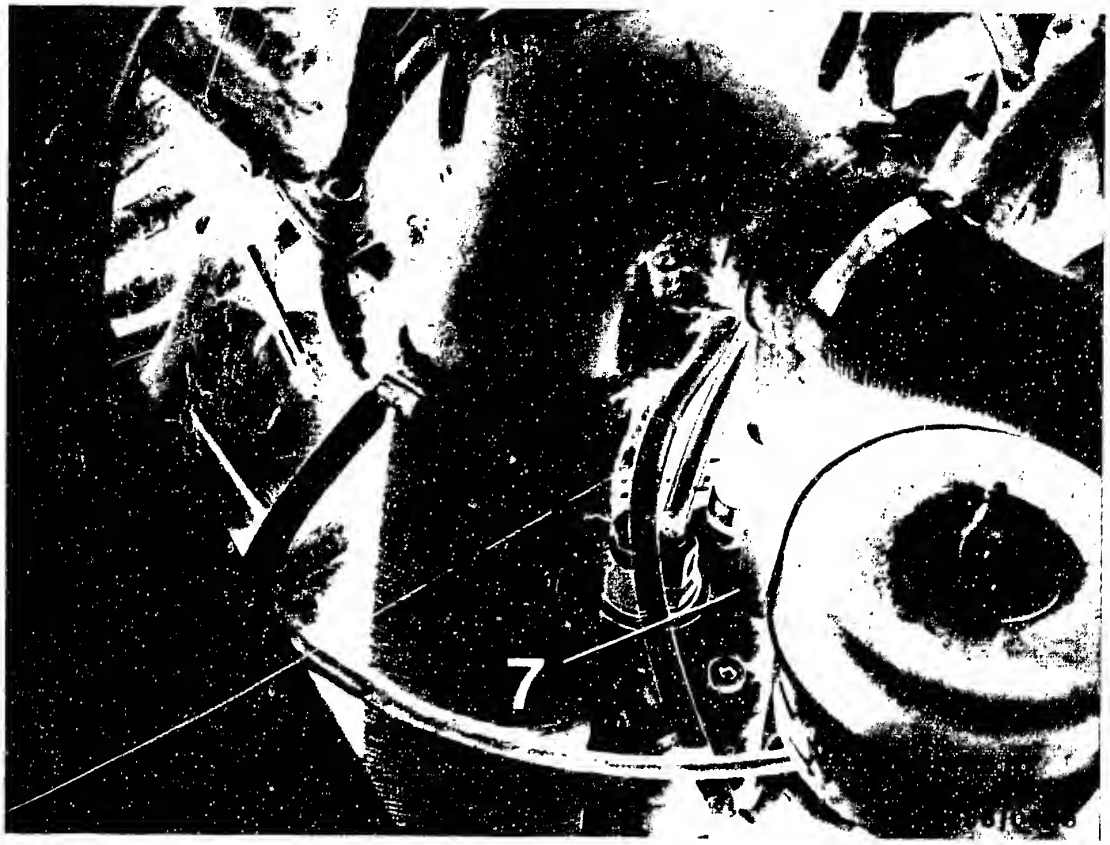
6. Installation position of individual components

The start valve (not visible in the picture) is mounted on the rear side of the intake housing below the throttle-valve assembly.

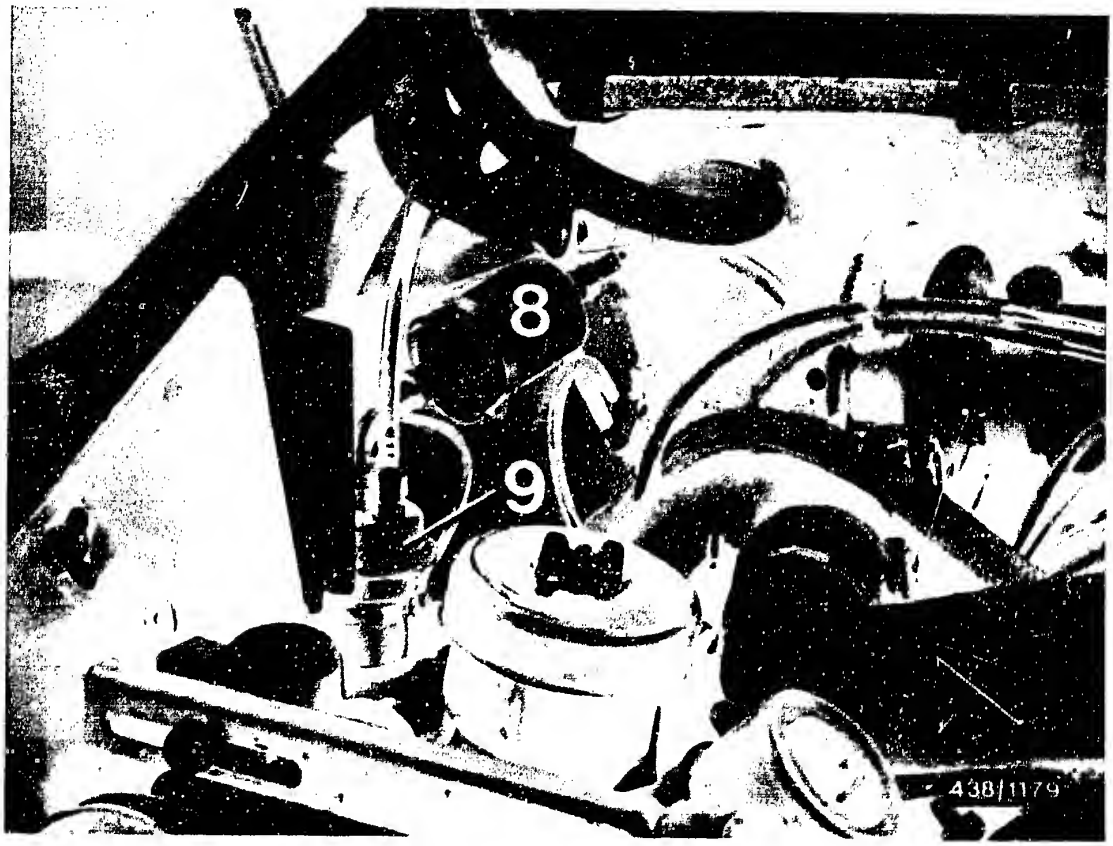
In the engine housing, below the secondary air pump, there is the thermo-time switch for all models as of 8.73 (likewise not visible in the picture).



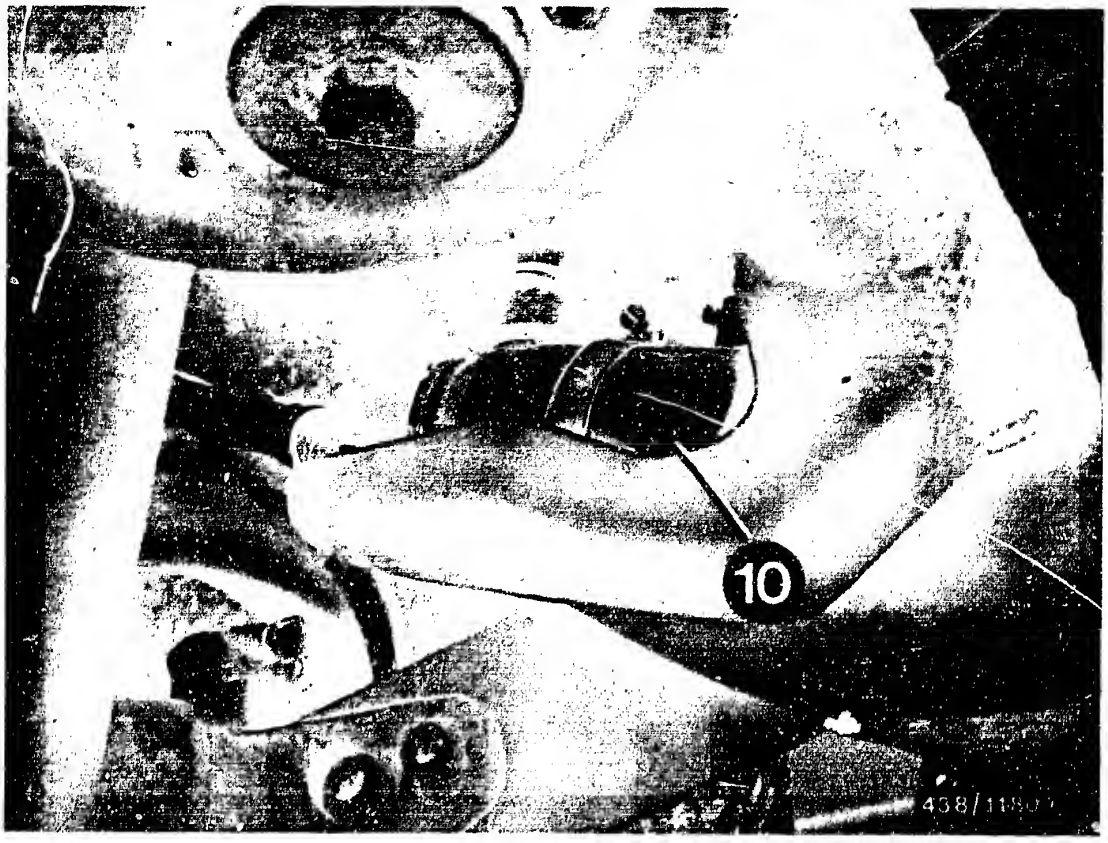
5 = Injection valves; each plugged into the flange of the intake tube.
6 = Auxiliary-air device (all models as of 8.74)



7 = Warm-up regulator



8 = Fuel filter
9 = Fuel accumulator



10 = Electric fuel pump

The electric fuel pump is under the vehicle floor, in front of the protective tube of the torsion bar for the left-hand rear wheel.

7. Trouble-shooting chart

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits pin-pointed trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 2 - B 5 is intended to make it easier to decide which test steps have to be performed for which faults.

Select the possible cause in the trouble-shooting chart in accordance with the complaint stated by the customer or which you yourself have determined. The Coordinate at the end of the cause column refers to the appropriate test step with the corresponding test specification.

7. Trouble-shooting chart (see also coordinates (C4/C5)

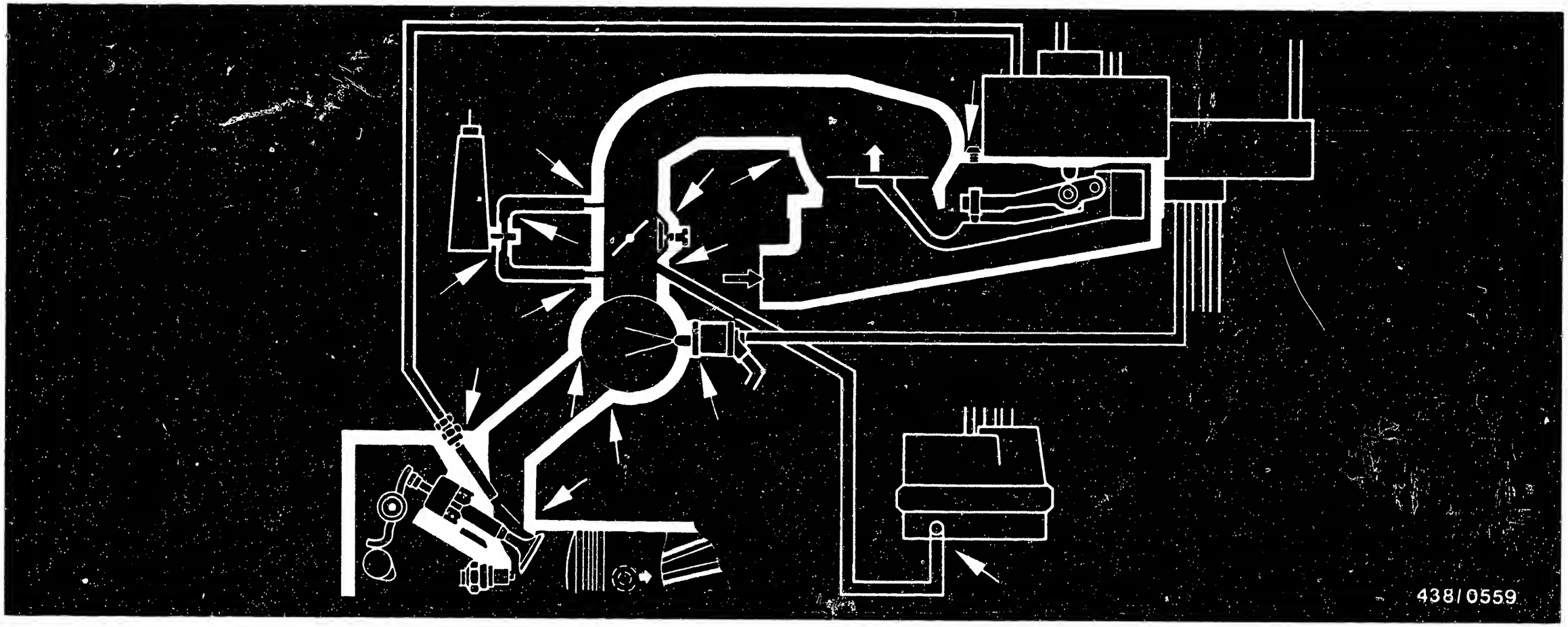
Customer complaint (fault symptom)

1. Engine does not start, or starts poorly, in cold condition
2. Engine does not start, or starts poorly, in warm condition* (hot-starting difficulties)
3. Irregular idling during the warm-up phase (shakes)
4. Irregular idling with warm engine (shakes)
5. Engine does not draw gas, burbles
6. Engine misfires when operating on the road, high load
7. Insufficient power

*Note
If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay.
The fitting of this relay is described in Coordinate L5.
(Applies only to 74 and 75 models)

1	2	3	4	5	6	7	Cause	Coordinates
	●	●	●	●		●	Vacuum system leaking	C 6
●	●		●	●	●	●	Air-flow sensor lever and/or control plunger not moving smoothly	C 8
	●						Position of the air-flow sensor plate incorrect	C 17
●		●					Auxiliary-air device not opening (75 model). Hand throttle lever not pulled (73/74 model)	C 22
●	●				●		Electric fuel pump not operating	D 1
●							Cold-start system defective	D 5
		●	●				Cold-start valve leaking	D 5
				●			Excessive fuel delivery for control-pressure circuit	D 21
●		●					"Cold" control pressure outside tolerance	E 2
	●		●	●	●	●	"Warm" control pressure too high (after warm-up)	E16 mod. 75 USA
			●	●		●	"Warm" control pressure too low (after warm-up)	E16 mod. 75 USA
					●	●	Primary (system) pressure outside tolerance	F 6
	●						Overall fuel system leaking	F 14
●	●	●	●		●		Injection valves leaking, opening pressure too low	C 9
●	●	●	●			●	Unequal fuel delivery (imbalance of fuel delivery)	G 20
●	●	●	●	●			Basic CO adjustment incorrect	H 11
						●	Throttle plate does not open completely	-----

8. Engine runs on after being switched off ("diesels")	9. Fuel consumption too high	10. Flat spot during acceleration	11. CO concentration during idling too high	12. CO concentration during idling too low	13. Idle-speed cannot be adjusted (too high)	14. Engine starts but then immediately stops	Cause	Coordinates
		●		●			Vacuum system leaking	C 6
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly	C 8
●							Position of the air-flow sensor plate incorrect	C 17
					●		Auxiliary air device does not close	C 22
						●	Electric fuel pump not operating	D 1
●	●			●			Cold-start valve leaking	D 5
		●				●	Excessive fuel delivery for control-pressure circuit	D 21
		●				●	"Warm" control pressure too high (after warm-up)	E16 mod. 75 USA
	●	●	●			●	"Warm" control pressure too low (after warm-up)	E16 mod. 75 USA
		●				●	Primary (system) pressure outside tolerance	F 6
●							Injection valves leaking, opening pressure too low	C 9
		●					Unequal fuel delivery (imbalance of fuel delivery)	G 20
●	●	●	●	●			Basic CO adjustment incorrect	H 11

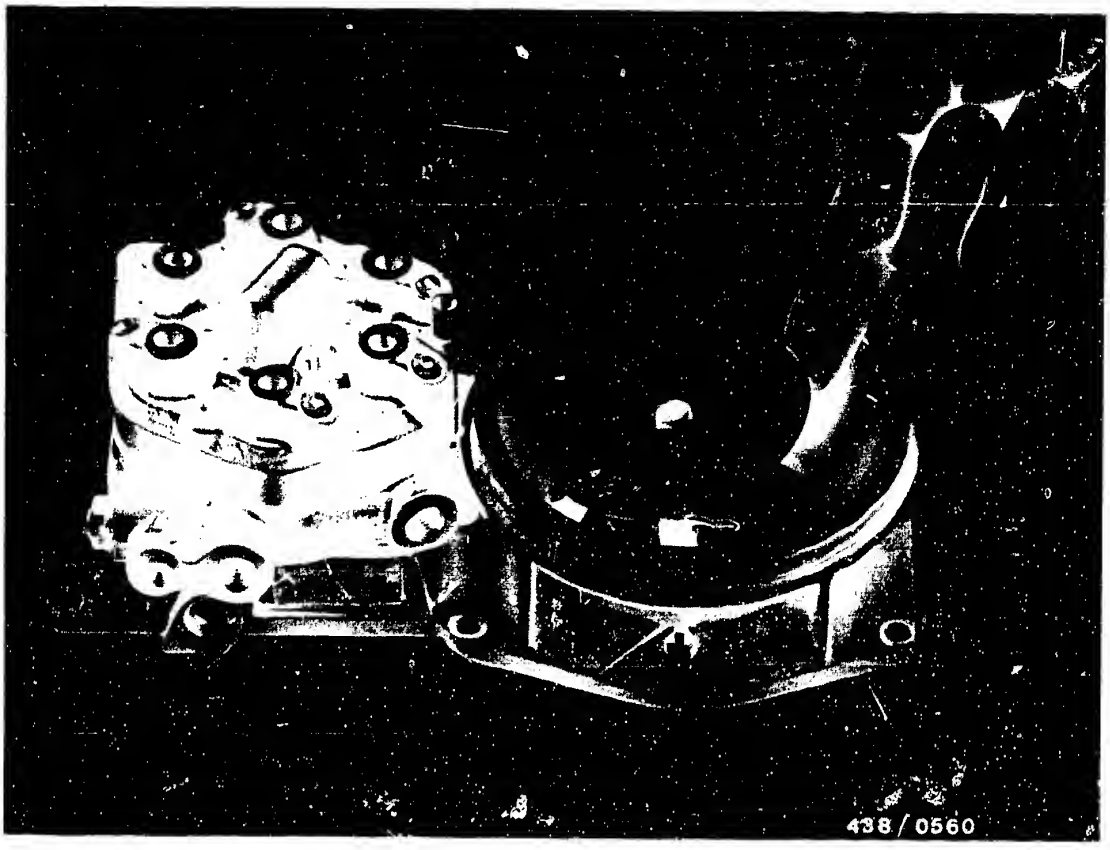


Working steps

8. Check the air-intake system of the engine for leaks.

The arrows in the diagram show typical points where leaks can occur.
Not to be seen in the picture but also to be checked: Seal on oil tank cover.
Check by performing a visual inspection or, in cases of doubt, as follows: Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Güpoflex).

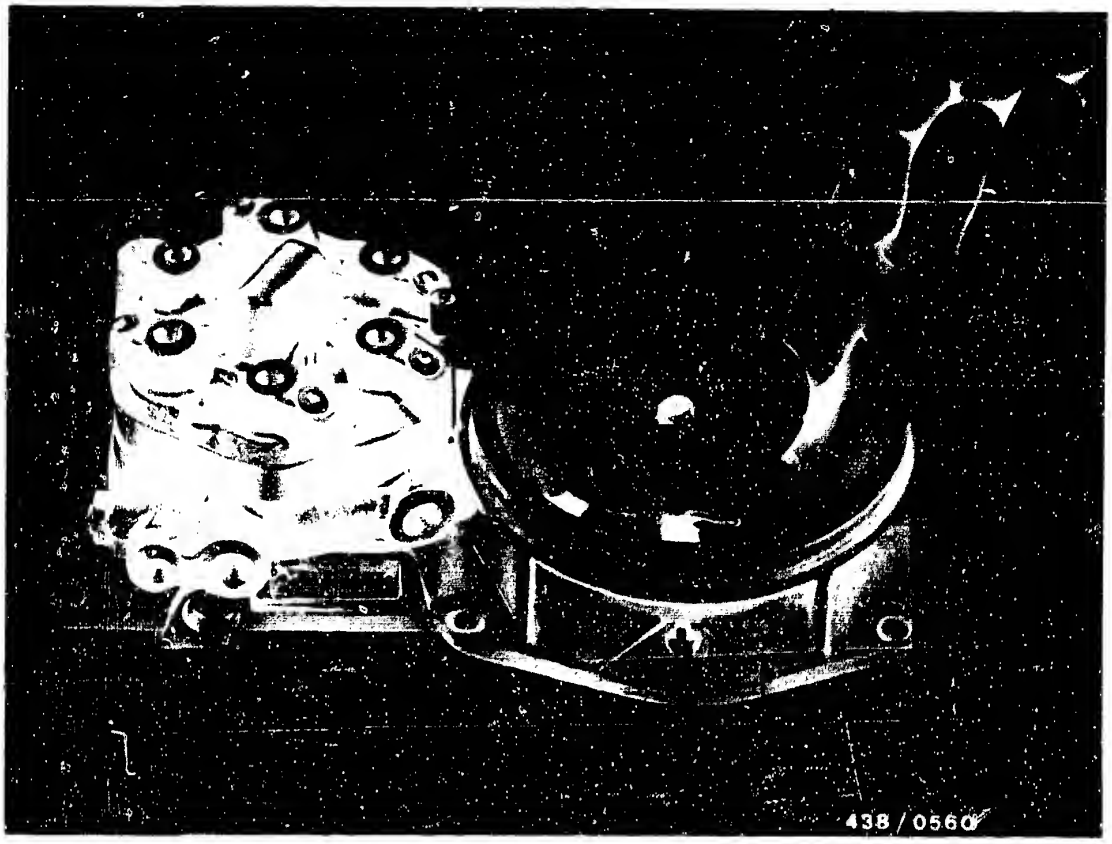
Under no circumstances may combustible liquids be used when testing for leaks.
The formation of bubbles or foam indicates a leak.
If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature: Idle-speed adjustment is described on Coordinates H 11.



9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

9.1 Preparations

Engine temperature not below +20°C.
Remove the rubber hood between air-flow sensor and throttle-valve assembly so that the air-flow sensor plate becomes accessible.
Switch on the electric fuel pump for approx. 10 seconds by switching on the ignition.
This results in application of the control pressure to the control plunger in the fuel distributor.

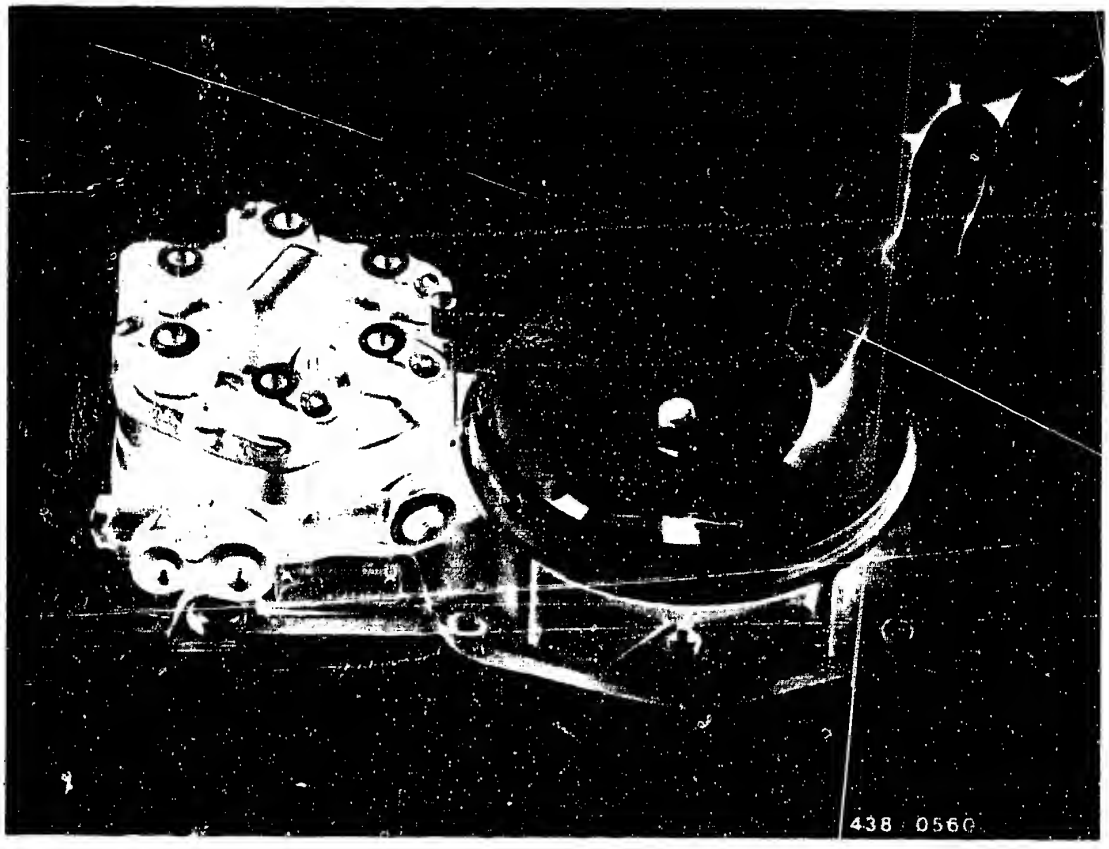


9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand and release again.
The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop.

If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.
If, with the fastening screws released, the control lever moves freely, replace the seal between air-guide housing and air-flow sensor (Porsche service part).

Tighten the fastening screws uniformly cross-wise. If there is no housing deformation, repair or replace the air-flow sensor.



9.3 Check that the control plunger moves freely.

Raise the air-flow sensor plate by hand (updraft). The same resistance must be felt over the entire movement.

Move the sensor plate rapidly back to a position just in front of the zero stop.

The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever. If this condition is fulfilled, the control plunger can be considered to move freely.

If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.

Important!

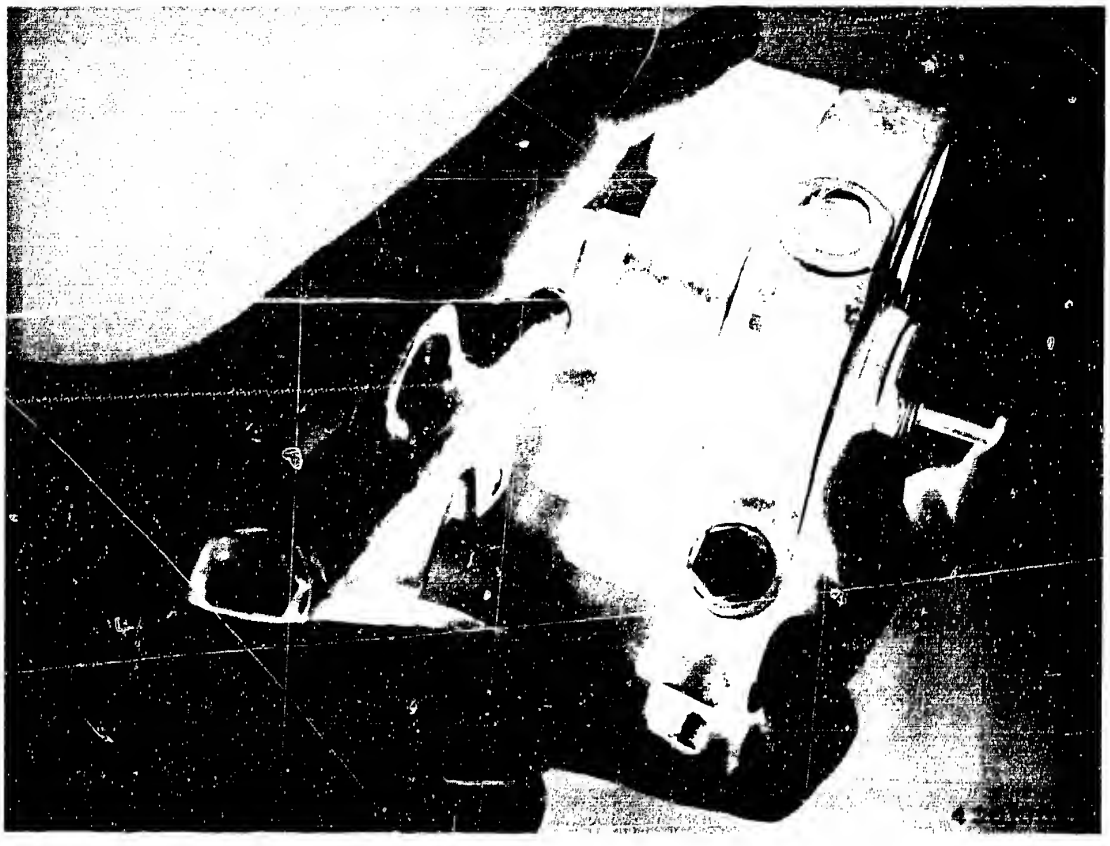
Note the following when installing fuel components and fuel lines:

Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component.

Clean the fuel distributor thoroughly in the region of the fuel connections. Screw off all connections.

In the case of fuel distributor 0 438 100 004 with fixed tailpieces, the fixed inlet line should first of all be left or unscrewed on the fuel filter.



Screw out three fastening screws and remove the fuel distributor from the air-flow sensor.

Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor

Note on replacing the fuel inlet line on fuel distributor 0 438 100 004:

Using a soldering iron, cut open the fuel line in the region of the fitting and pull off.

Caution: Never use an open flame for heating the line. Danger of fire.

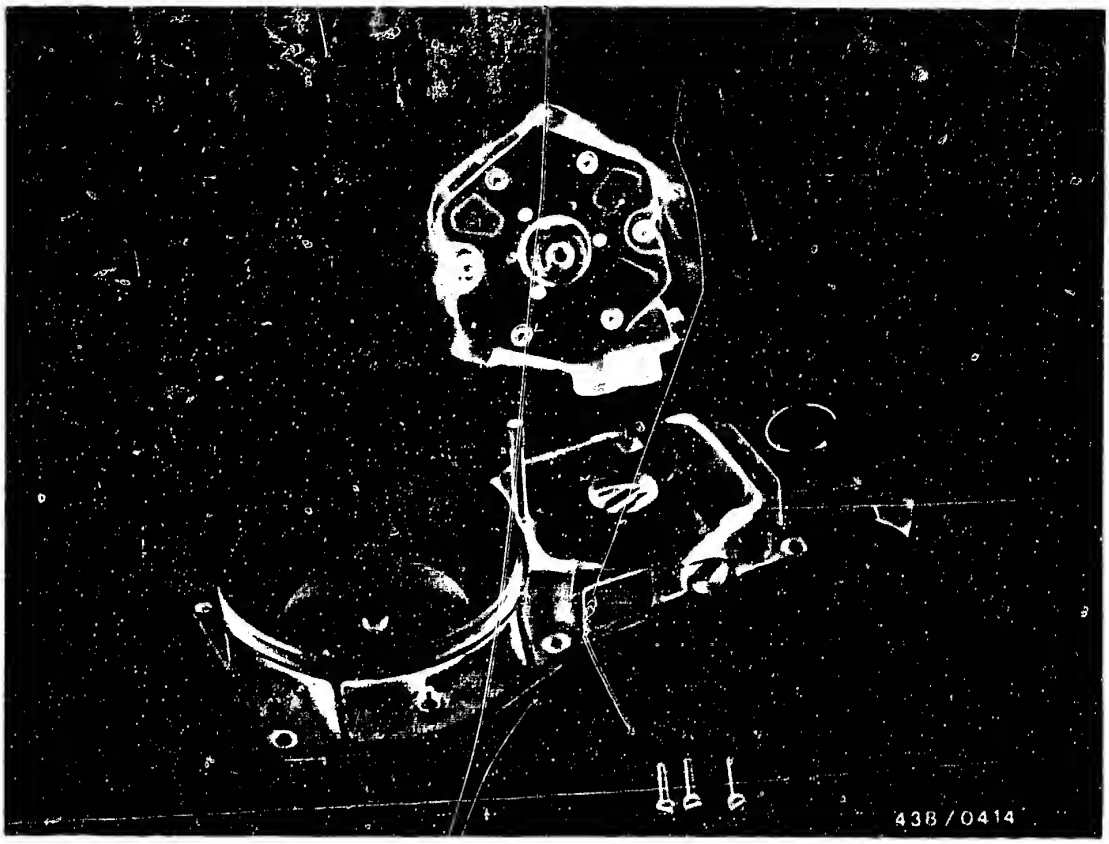
Cutting open the line with a knife is likewise not advisable if only the line is to be replaced and if the fuel distributor is to be used again. The toothed section of the fitting would be damaged, and this may lead subsequently to leaks.

Mounting the line:

Cut off the section of the line which has been cut open.

Insert the line into assembly tool KDEP 1039 so that it projects by the length of the fitting.

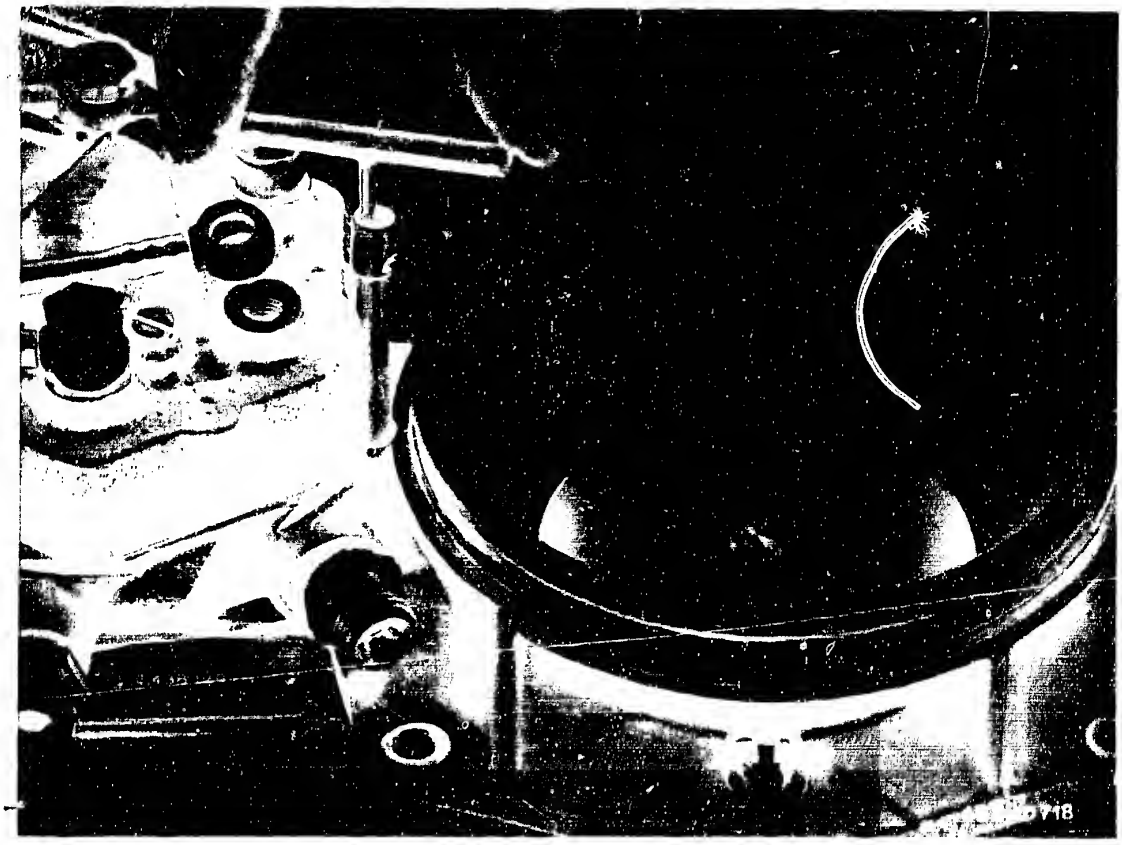
Press the line cold onto the fitting.
Important: Do not heat the line for pressing on since it will undergo permanent expansion, which will lead subsequently to leaks.



9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor.
Observe the tightening torque 3.2...3.8 Nm (0.32... 0.38 kgfm) for the fastening screws precisely.

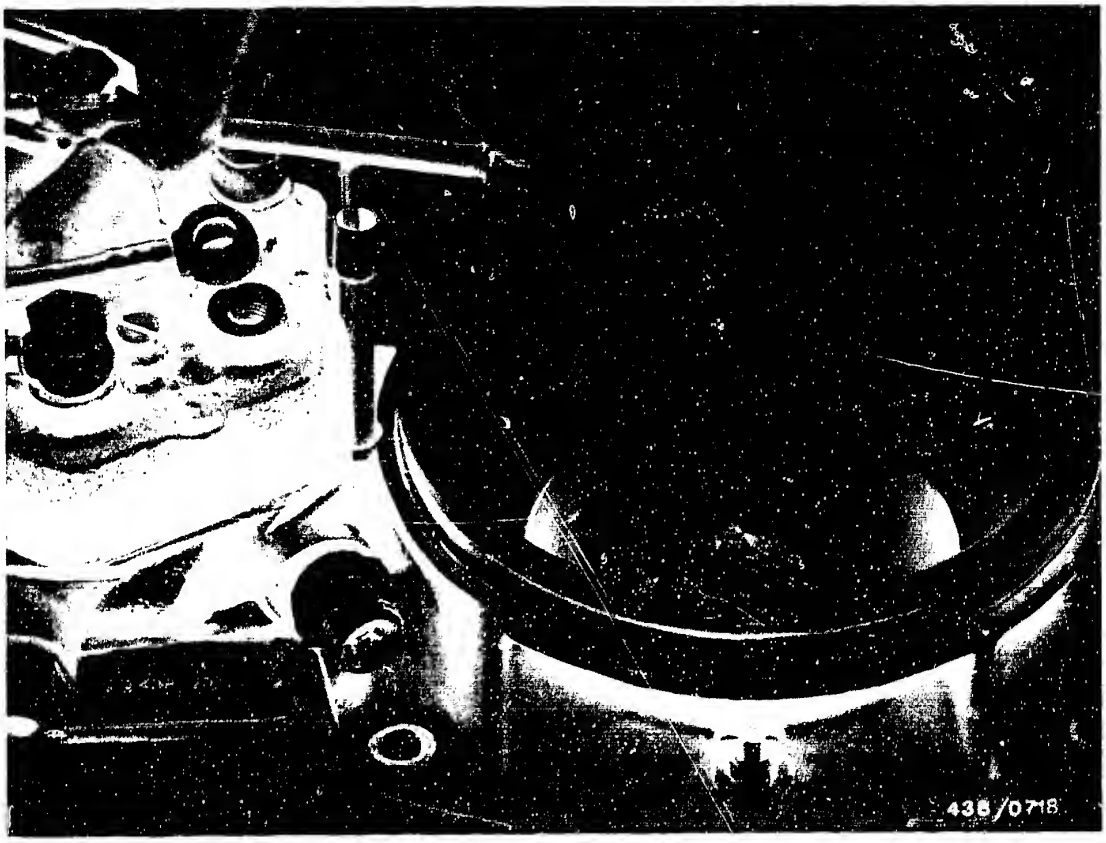
When connecting the fuel-injection tubing, use new seal rings.



9.5 Matching the fuel distributor to the air-flow sensor for initial starting:

Unscrew one injection line from the fuel distributor. Switch on the ignition so that the electric fuel pump operates.

Remove rubber plug from access hole to idle-mixture-adjusting screw in air-flow sensor. Insert adjusting wrench KDEP 1035 through the hole and into the idle-mixture-adjusting screw.



Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the adjusting screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

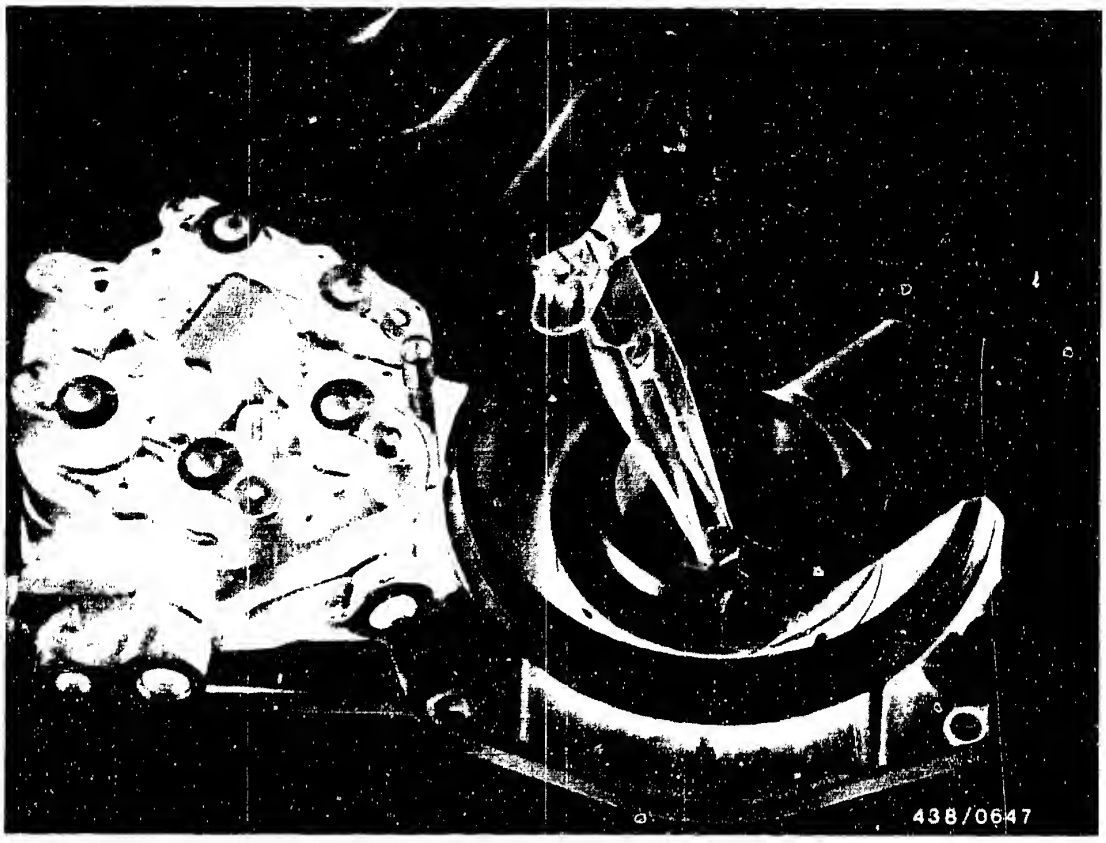
The final matching of air-flow sensor and fuel distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates H 11.

10. Checking and adjusting the position of the air-flow sensor plate

10.1 Preparations

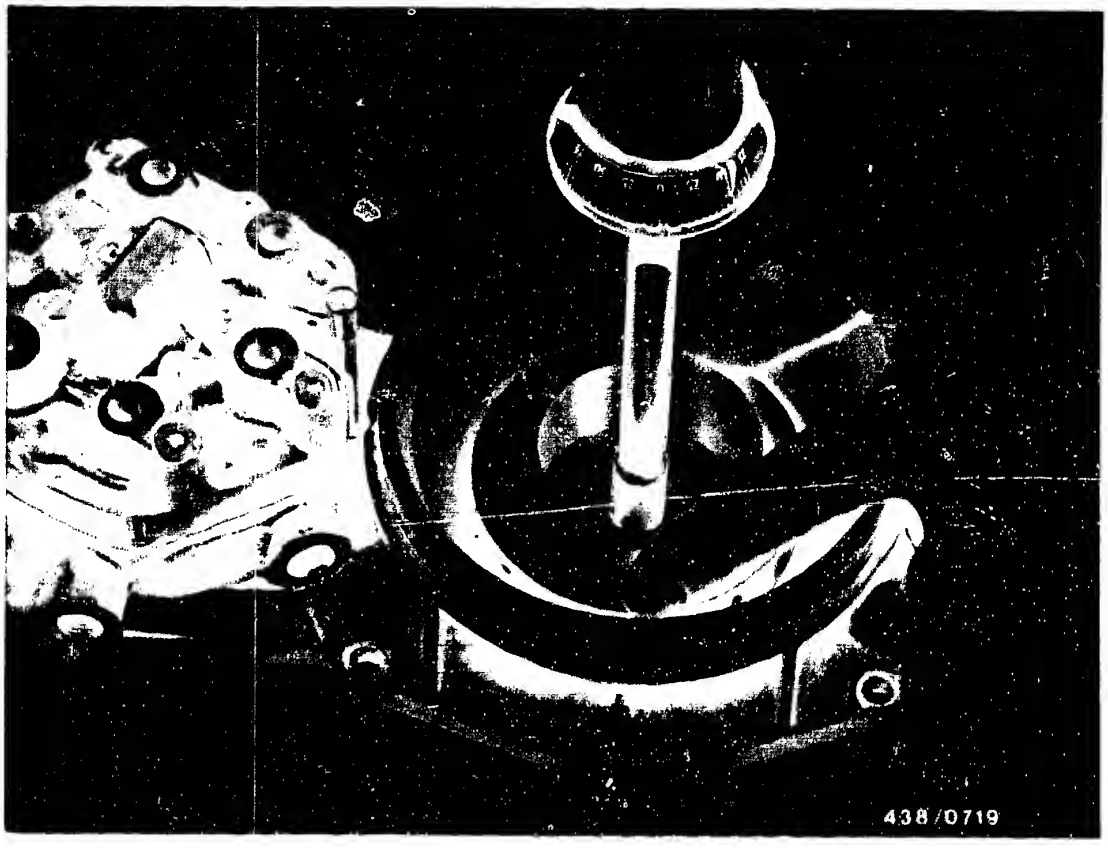
- Engine temperature is not important.
- Remove the rubber hood fitted between the air-flow sensor and the throttle-valve assembly (release 2 clamping bands), so that the air-flow sensor plate becomes accessible.



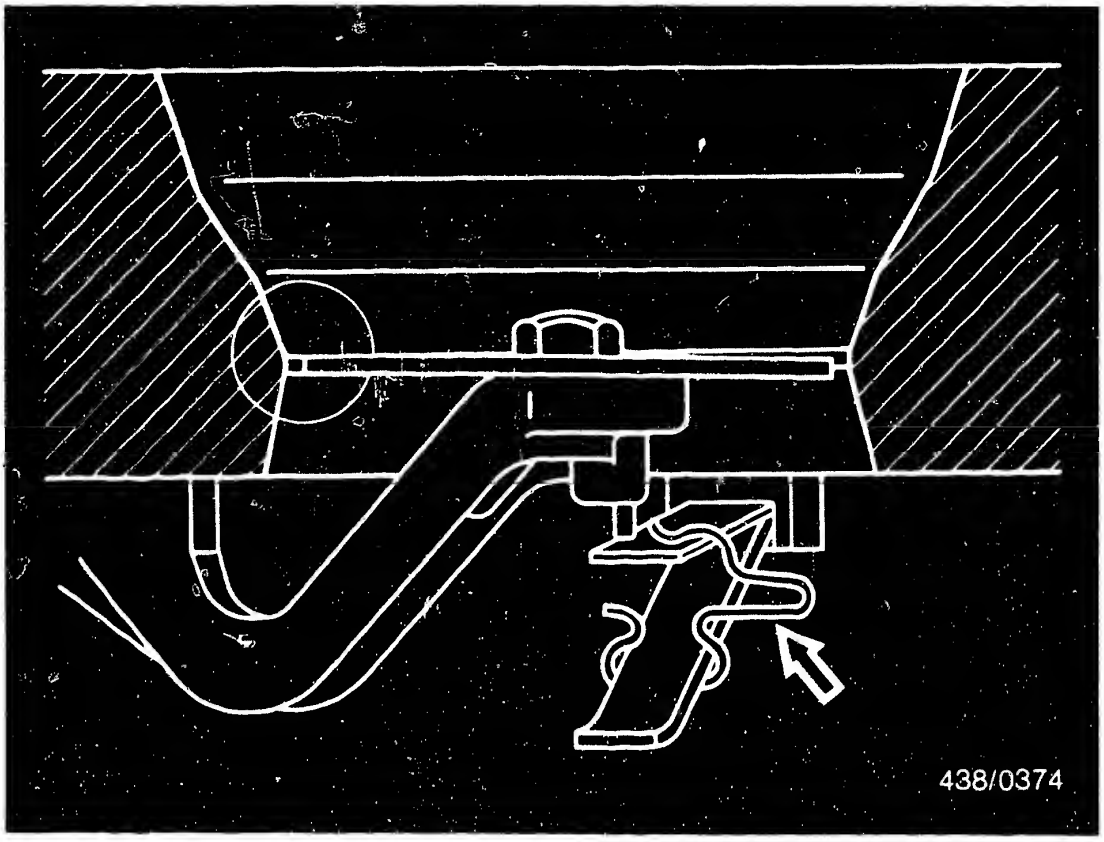
10.2 Centering the air-flow sensor plate

Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel. If necessary, center it using a positioning ring KDEP 1040/13 (dia. 85 mm) 911 T, 1.73...7.73) or KDEP 1040/10 (80 mm dia., 911 and 911 S as of 8.73).

Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screw with pliers so that the sensor plate does not deflect downwards.



With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.
When tightening the screw make sure that the air-flow sensor plate is in its zero position (in the cylindrical part of the air funnel).
It must no longer be possible to turn the air-flow sensor plate by hand.

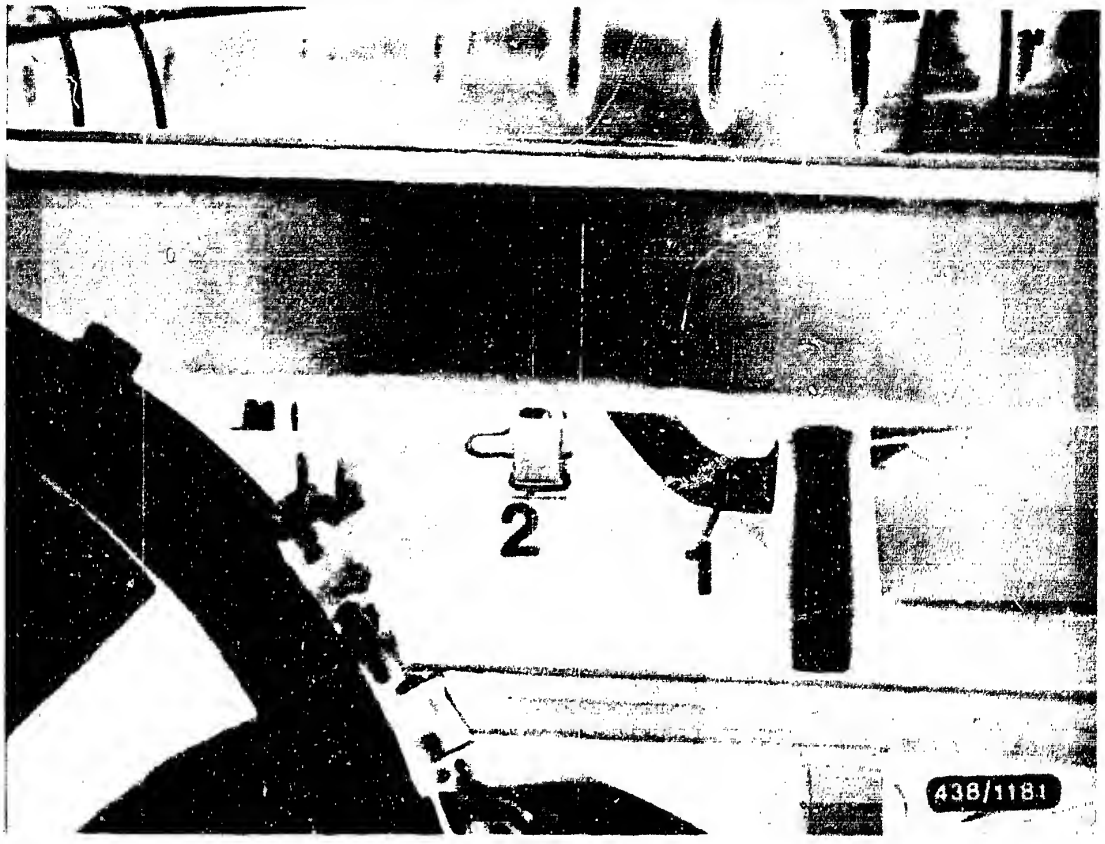


10.3 Checking and adjusting the zero position of the sensor plate (rest position):

Switch on the electric fuel pump for approx. 10 seconds by switching on the ignition.
This results in application of the control pressure to the control plunger in the fuel distributor.

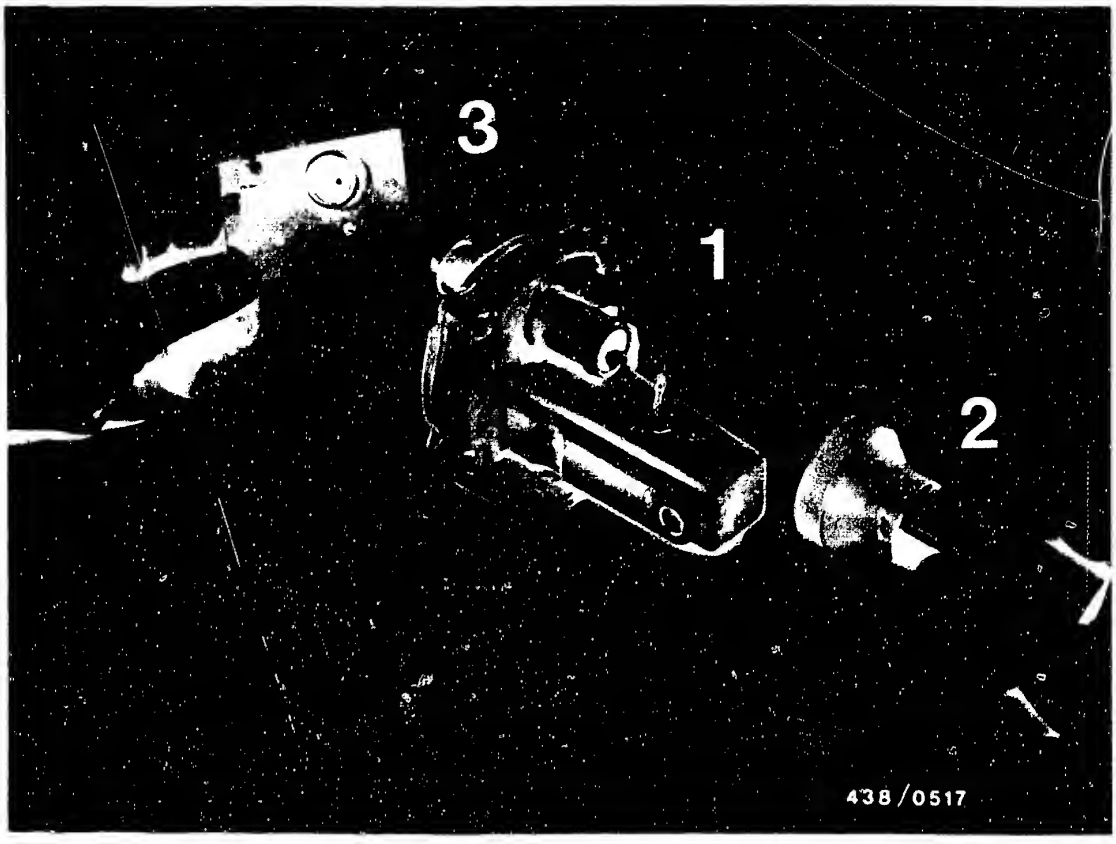
The upper edge of the sensor plate must be flush with the cone in the position marked with a circle in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.

If necessary, the position of the leaf-spring limit-stop can be corrected by adjusting the shaped spring (arrow).



1 = Control lever
2 = Shaped spring

Control lever (1) and shaped spring (2) are easily accessible after removing the air filter (unhook 2 rubber bands).



1 = Auxiliary-air device
2 = Flashlight
3 = Mirror

11. Checking the operation of the auxiliary-air device. (75 model only)

The engine must be cold.
Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.
Disconnect both air hoses from the auxiliary-air device.
Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.
It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.

- If an opening is not visible with the engine cold, replace the auxiliary-air device.

- Fit the electric cable plug on the auxiliary-air device.

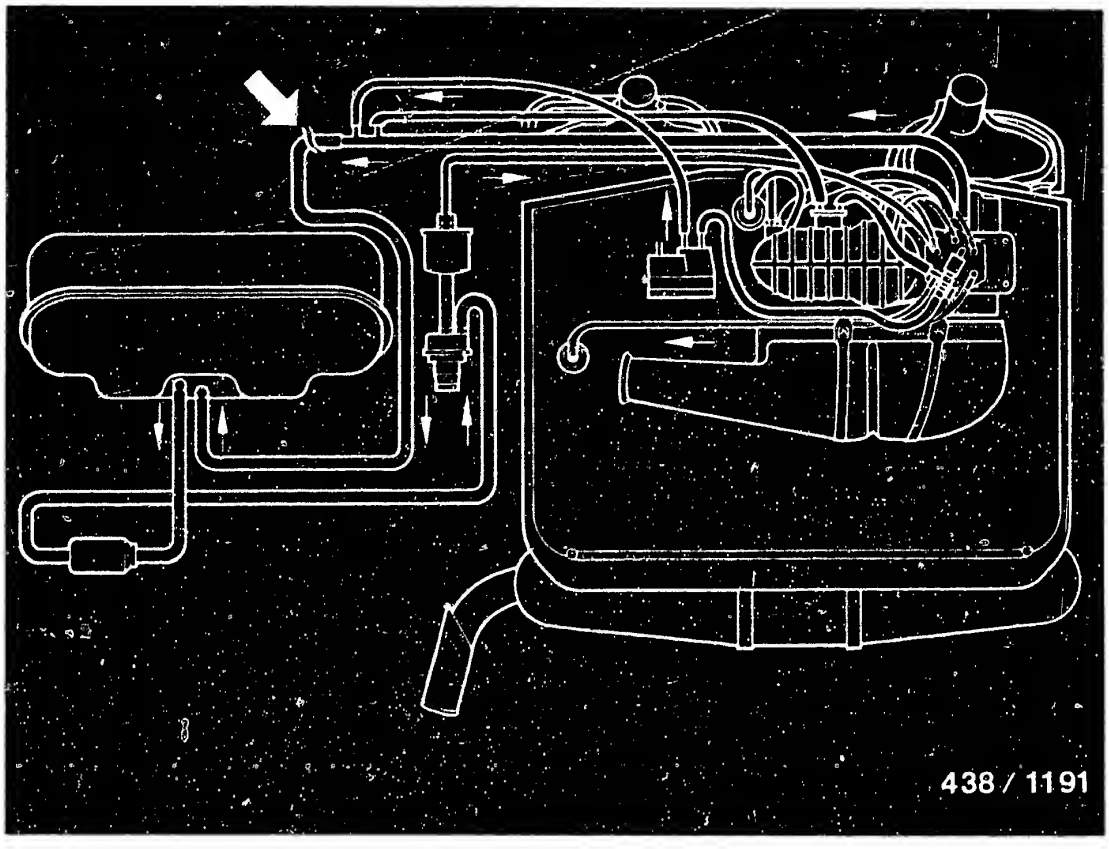
- By bridging the electrical safety circuit, supply power to the auxiliary-air device.
  After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.

- If the blocking plate does not close, check the power supply (open circuit, voltage drop).
  Minimum voltage across the connector 11.5 V with the engine stopped.

- If these points are O.K., check the heating coil of the auxiliary-air device for an open circuit using an ohmmeter.

- Replace the auxiliary-air device if defective.

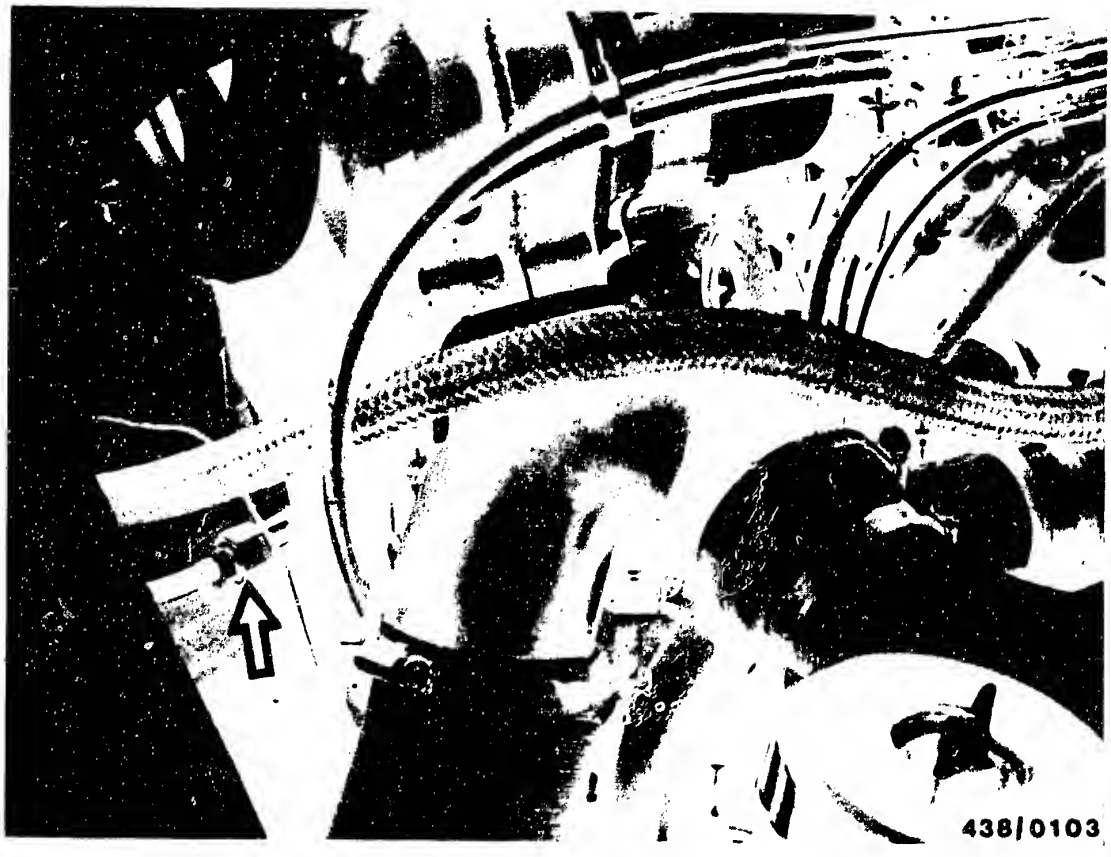
When the auxiliary-air device has been replaced, readjust the idle speed with the engine at normal operating temperature. Idle adjustment is described on Coordinates H 11.



12. Checking the operation of the electric fuel pump.

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow).



12.2 The measuring point is the outlet of the T-piece in the fuel return line (arrow).

On the 73 and 74 models the test hose is secured with a hose band. As of the 75 model polyamide lines are laid with screw connections (see picture). Therefore, the test hose is to be equipped with a hose nipple with male thread M 14 x 1.5 and 60° inside cone.

12.3 Testing:

The measurement is performed with the engine stopped.

While measuring, switch on the electric fuel pump by switching on the ignition.

12.4 Test specification

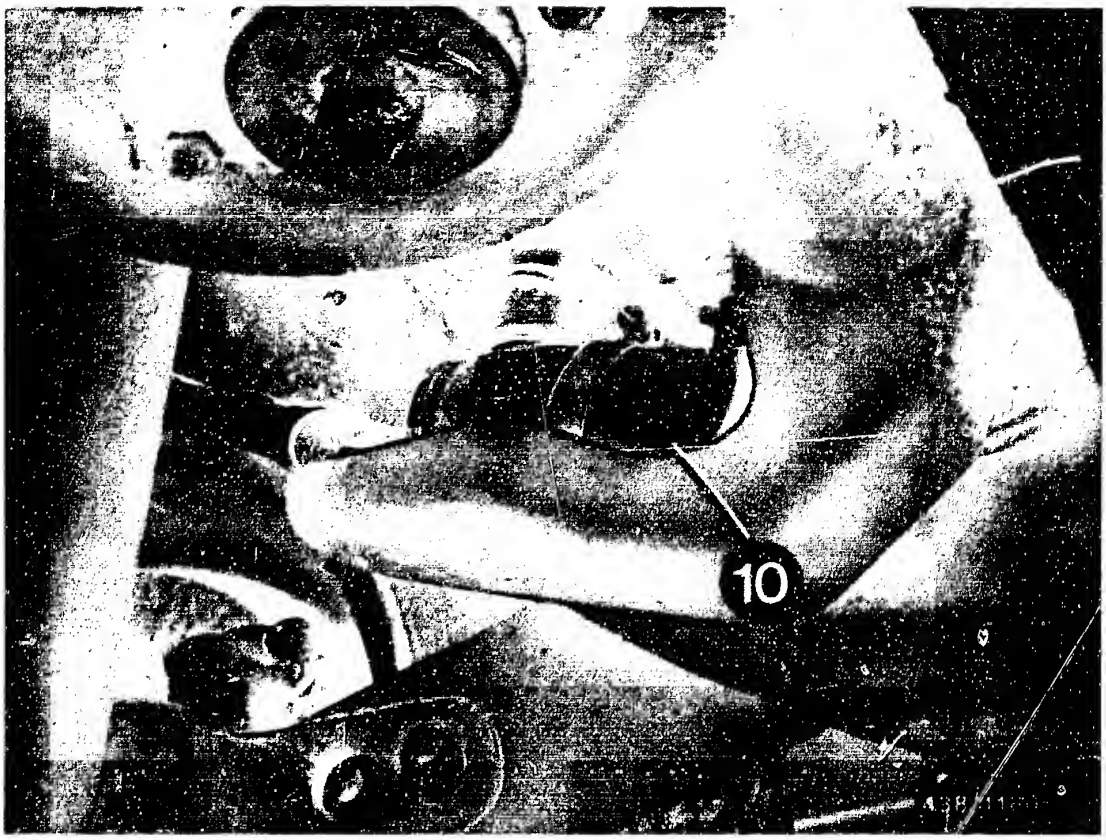
Fuel delivery

Delivered quantity: At least 850 cm^3 within 30 seconds.

12.5 Possible causes of insufficient fuel delivery

- Power supply to the electric fuel pump defective, voltage drop. Minimum voltage at terminal with pump operating = 11.5 V.
- Fuel filter very dirty.
- Strainer in the double-fitting of the fuel-distributor inlet is blocked.

If these points are O.K., the fault lies in the electric fuel pump itself.
Replace the electric fuel pump.



10 = Electric fuel pump

12.6 Removing and installing the electric fuel pump:

Before loosening the connections, pinch off the intake hose (e. g. using hose clamper W 157 from Matra Co.).

Thoroughly clean both connections before loosening. On the 73 and 74 models, pull off the delivery-side hose line after loosening the hose binder from the inlet union.

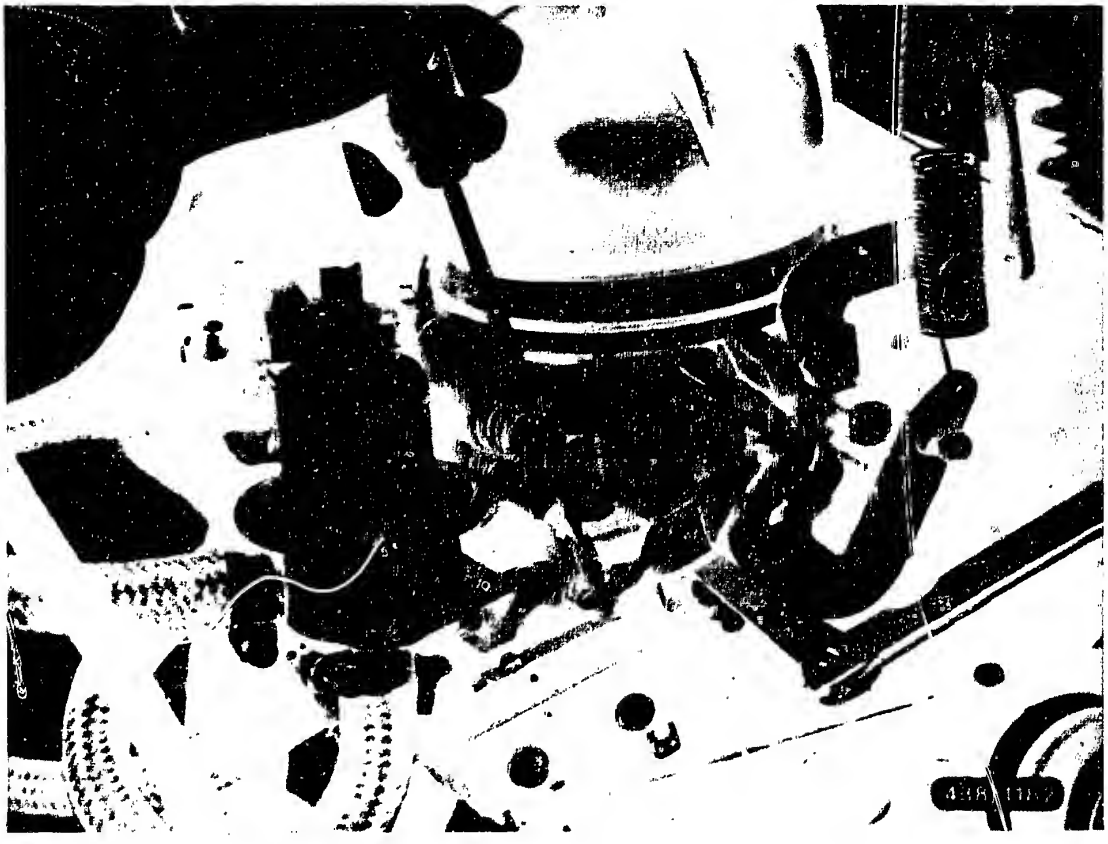
On the 75 model with polyamide line remove the pump with complete line (to fuel accumulator). Always remove the pump before loosening and connecting the delivery-side inlet union with inlet-union screw. Do not clamp the pump in a vice; have someone hold it. Observe tightening torque for inlet-union screw (16...20 Nm - 1.6...2.0 kgfm) precisely.

13. Testing the cold-start system (throttle-valve switch, thermo-time switch, start valve)

13.1 Preliminary remarks:

The cold-start system of the 911 T model does not contain a thermo-time switch. The start valve is connected to positive directly through terminal 50. The ground connection is through a throttle-valve switch which is open with the throttle closed. As of approx. 5° throttle opening, the switch is closed, i.e. only with the throttle open can the start valve inject when starting.

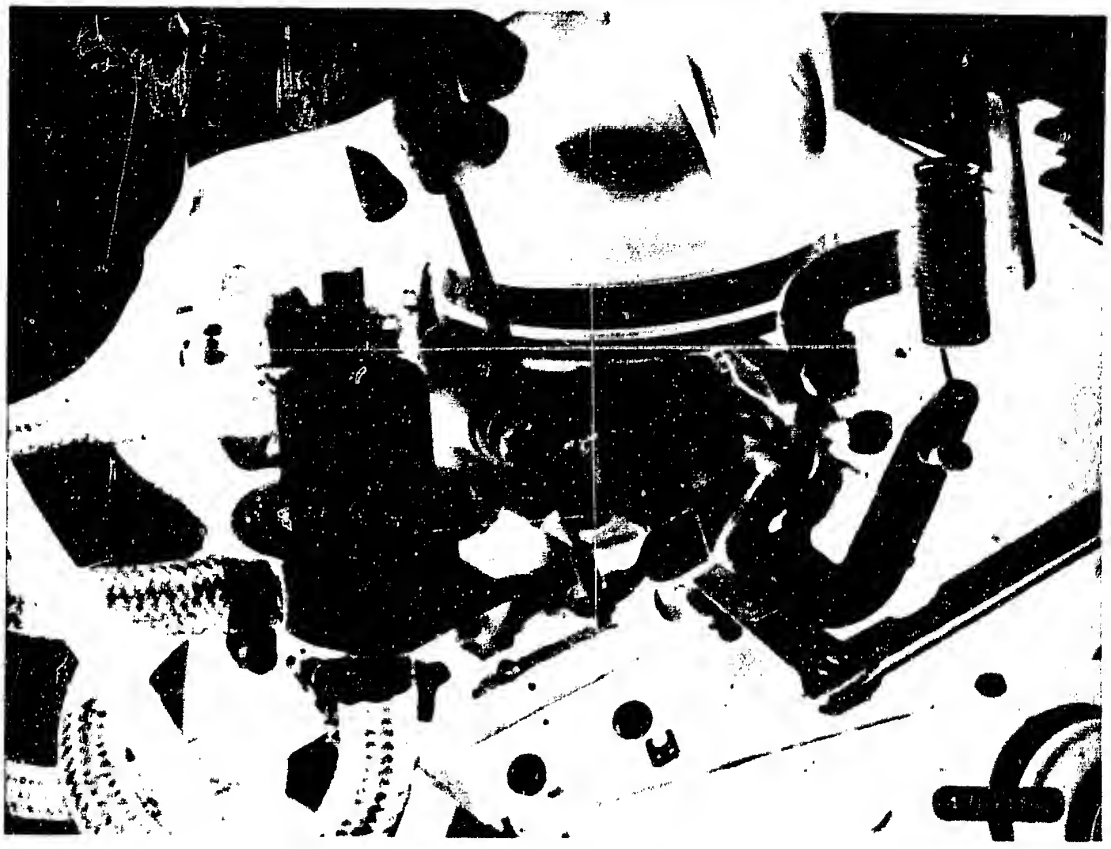
In the 911 and 911 S models there is additionally a thermo-time switch. In this case, the positive connection for the start valve is through the throttle-valve switch, and the ground connection is through the thermo-time switch.



13.2 Throttle-valve switch, functional test and adjustment:

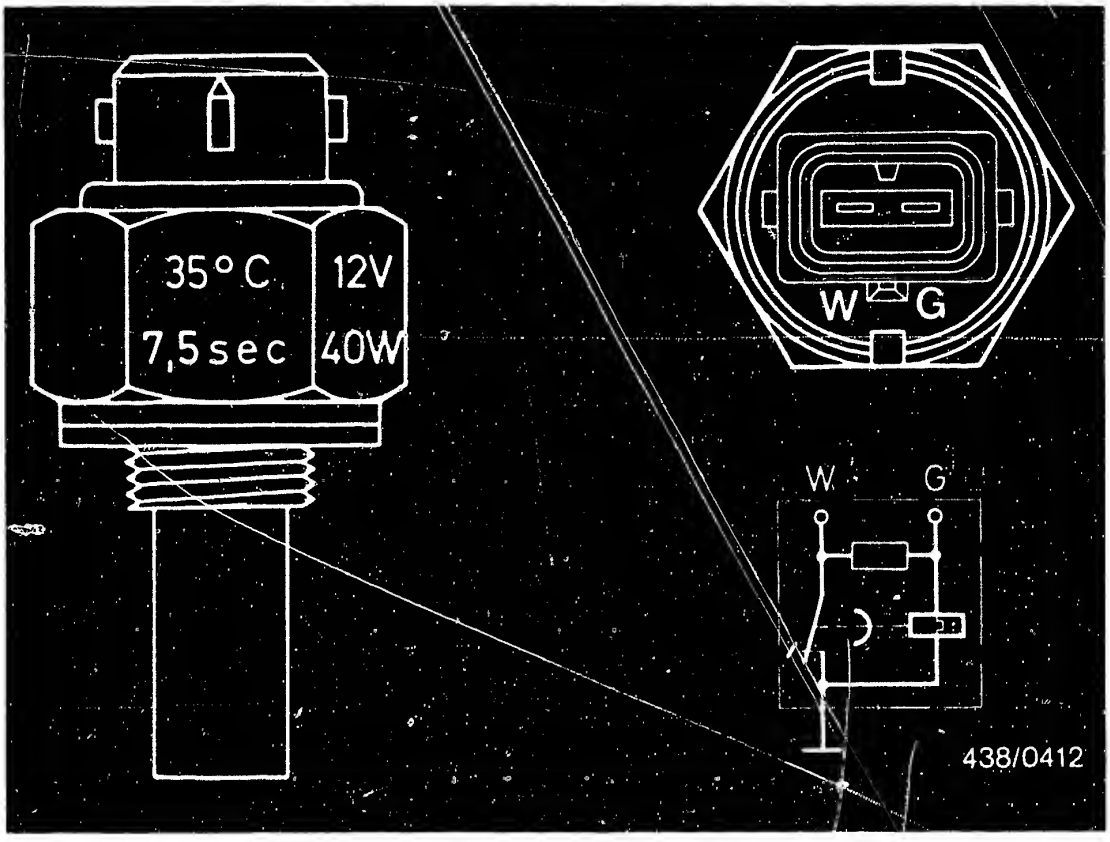
Test with ohmmeter or test buzzer directly at the terminals of the throttle-valve switch.

For the idle adjustment of the throttle valve, the switch must be open; with the hand throttle lever (between the seats) pulled out all the way it must be closed.



Adjusting:
Introduce a 2 mm thick feeler gauge between stop lug of throttle-valve actuating lever and idle stop screw of throttle-valve assembly. In this position, adjust adjusting screw in actuating lever so that the throttle-valve switch just switches (closes).

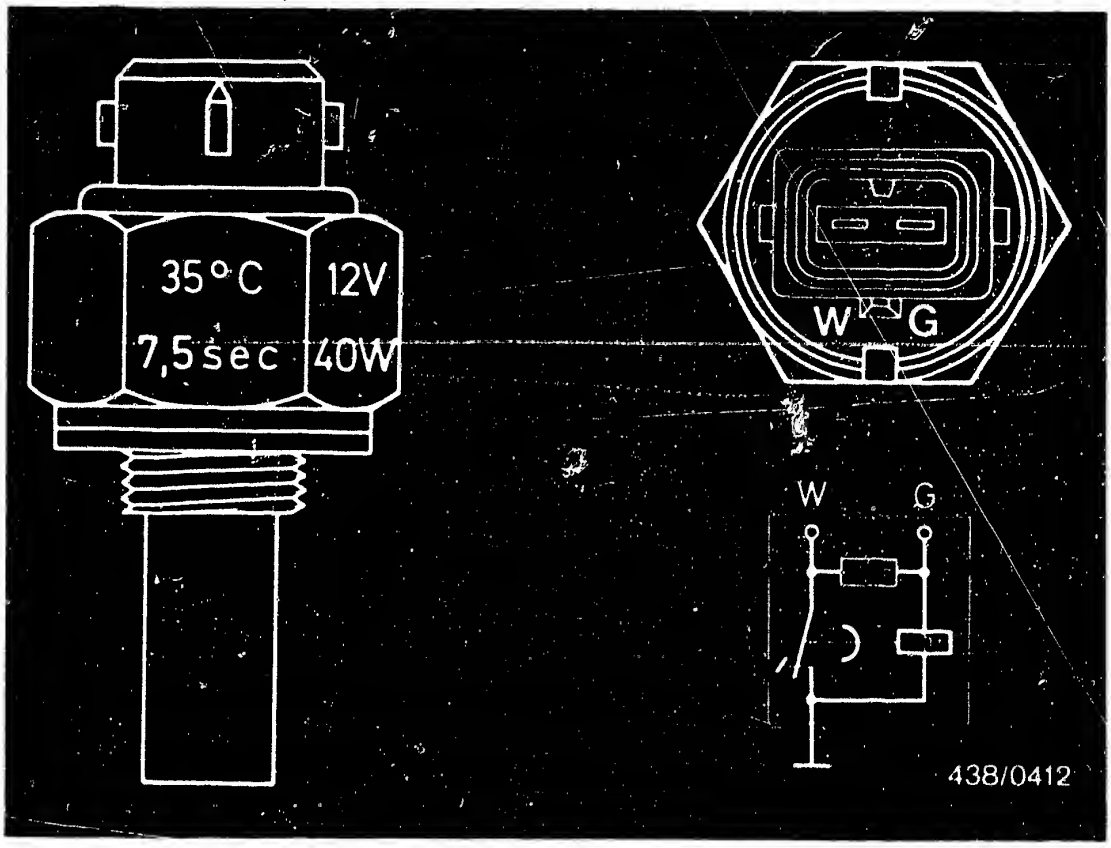
It must be possible to press the switching lever of the throttle-valve switch at least another 0.5 mm.
Then test once again whether the switch is closed when the hand throttle lever is pulled all the way out.



13.2 Thermo-time switch (only 911 and 911 S, as of 8.73):

Remove the thermo-time switch for testing.

It is situated in the engine housing under the secondary-air pump/ignition distributor. For better access, it may be necessary to remove the ignition distributor.



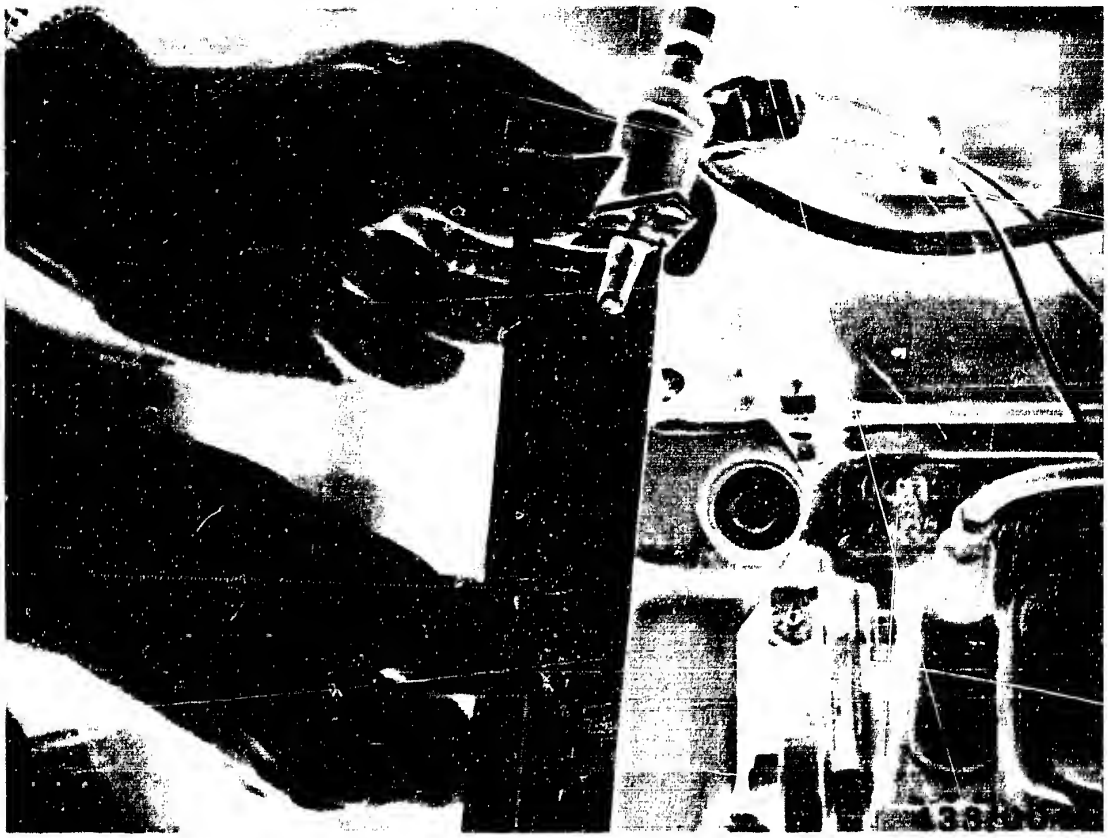
The thermo-time switch used in the Porsche (not a Bosch product) has a switching temperature of 35°C and a switching time at -20°C of 7.5 seconds. Both values are marked on the hexagonal section of the thermo-time switch.

The removed thermo-time switch is tested using an ohmmeter in accordance with the values given below.

The temperatures for the thermo-time switch can easily be obtained with water. Cooling takes place in a freezer chest.

Resistance measurement (Ω) between

At a temperature below °C	above °C	Term. "G" and "ground" (housing)	Term "W" and "ground" (housing)	Term "G" and term. "W"
+30		25...40 Ω	0 Ω	25 ... 40Ω
	+40	50...80 Ω	100...160 Ω	50 ... 80Ω



13.3 Start valve:

Remove the start valve for testing. Fuel line remains connected. The start valve is mounted on the back of the intake housing, below the throttle-valve assembly. For removal and installation, it is advisable to use a mirror so that the connections and fastening screws are visible.
Disconnect the connector and connect the start valve directly to ground and terminal 15 (e. g. on the ignition coil) using connecting cable KDJE 7450/70.
Important:
Do not hold connecting cable against B+. Danger of fire due to sparks.
Hold the start valve in a container (e. g. graduate).

Switch on the ignition (max. 30 seconds) so that the electric fuel pump operates. At the same time the start valve must open and must squirt a finely atomized uniform spray of fuel.

Switch the ignition off again and disconnect the plug from the start valve.

Note: Do not disconnect the test lead while it is live. Otherwise sparks and danger of fire due to residual fuel spray.

Switch the ignition on again so that primary pressure is applied to the start valve. Dry off the nozzle of the start valve.

Within the next minute no drops must fall from the nozzle. Even when shaken and knocked the start valve must not leak.

Switch off ignition. Replace start valve if it does not open or if it leaks.

When a defective component of the cold-start system has been replaced, it is necessary finally to perform the idle adjustment with the engine at normal operating temperature.

The idle adjustment is described on Coordinates H 11.

14. Checking the control pressures

14.1 Preliminary remarks:

The control pressure of the K-Jetronic is normally determined by the warm-up regulator. The Porsche models 911 T, 911 and 911 S were equipped up to 7.74 (all versions) and up to 7.75 (worldwide version) with an additional throttle-actuated valve. This valve performs a load-dependent control-pressure correction. The USA 75 model was supplied without a throttle-actuated valve.

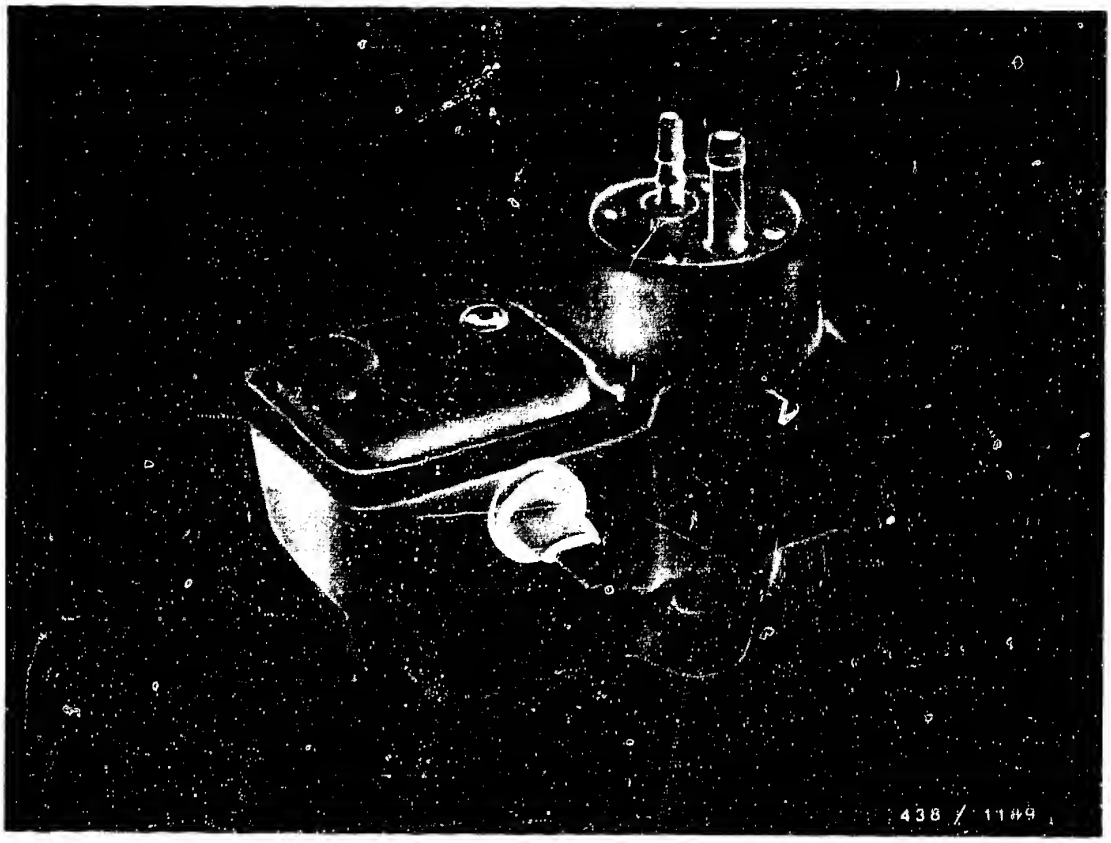
If incorrect measurement results are obtained in the following control-pressure tests, this may also be due to faults which are nothing to do with the warm-up regulator or throttle-actuated valve.

These possible faults are:

- No voltage or voltage too low acrosse the electrical connection of the warm-up regulator.
- Fuel return from warm-up regulator or throttle-actuated valve constricted or blocked.
- Fuel delivery for the control-pressure circuit too low or too high.

The testing of this control-pressure delivery is described at the beginning of the control-pressure tests.

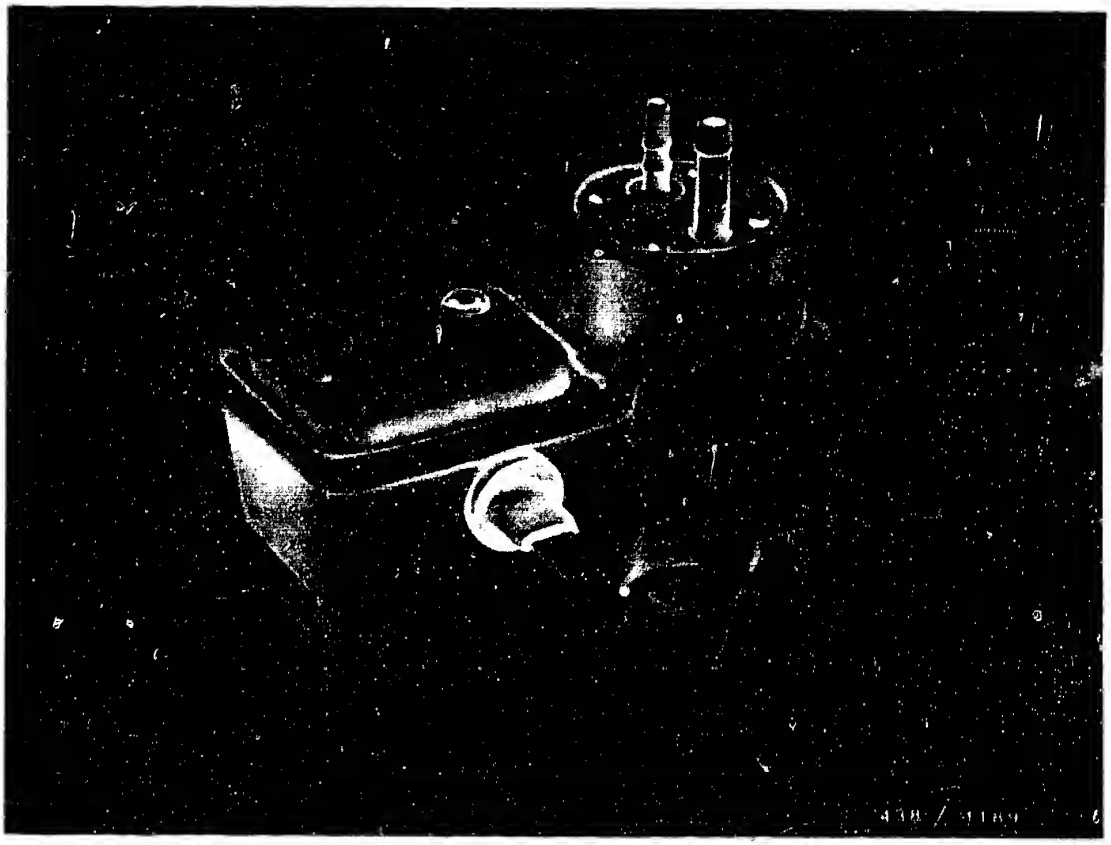
Test specification: 160...240 cm^3/min.
References are made in the respective test steps to the other possible causes of trouble.



14.2 Version of warm-up regulator:

Warm-up regulators 0 438 140 001 and .. 008 are versions with the old housing form and single electrical terminal. The ground return is through the housing.

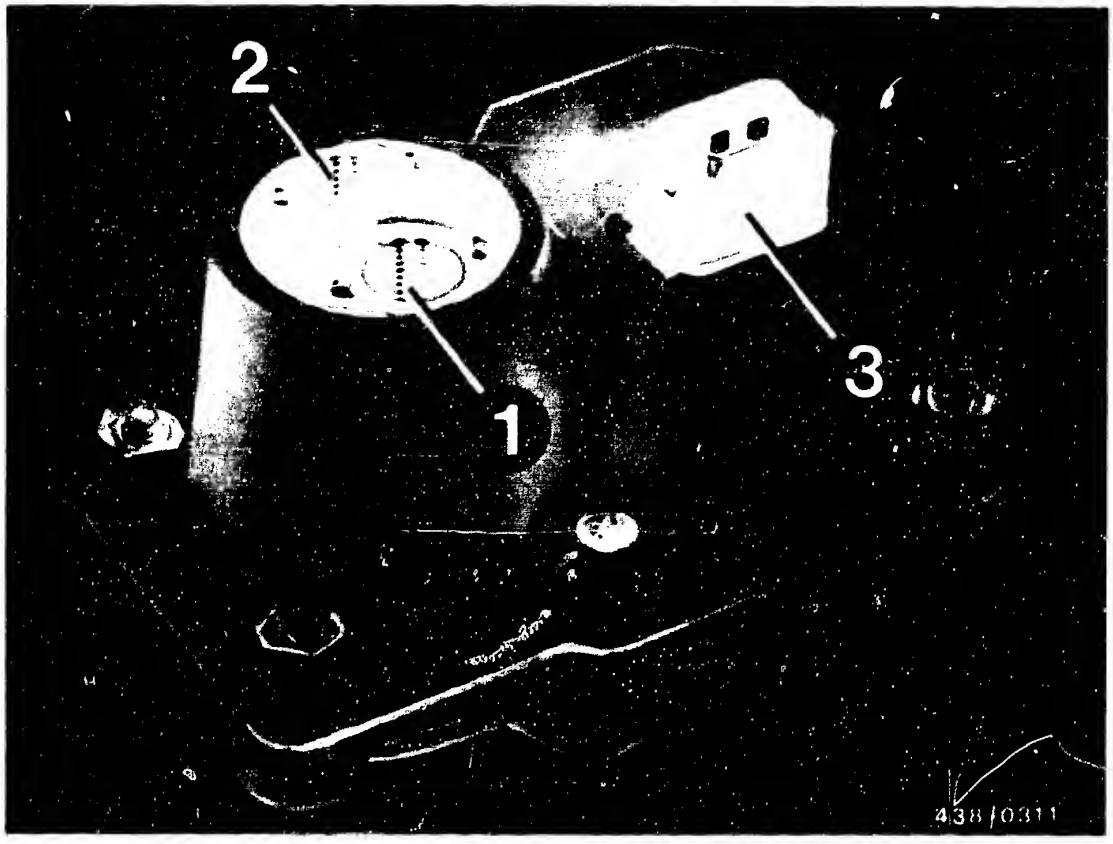
The tailpieces for inlet and return are fixed in the valve housing whereby the inlet fitting has a fishbone section for the polyamide line.



The operation of these warm-up regulators is the same as that of the current basic version, i. e. apart from the cold and warm control pressures they have no further functions.

Neither of these warm-up regulators are now available for replacement.

The replacement version is 0 438 140 129.

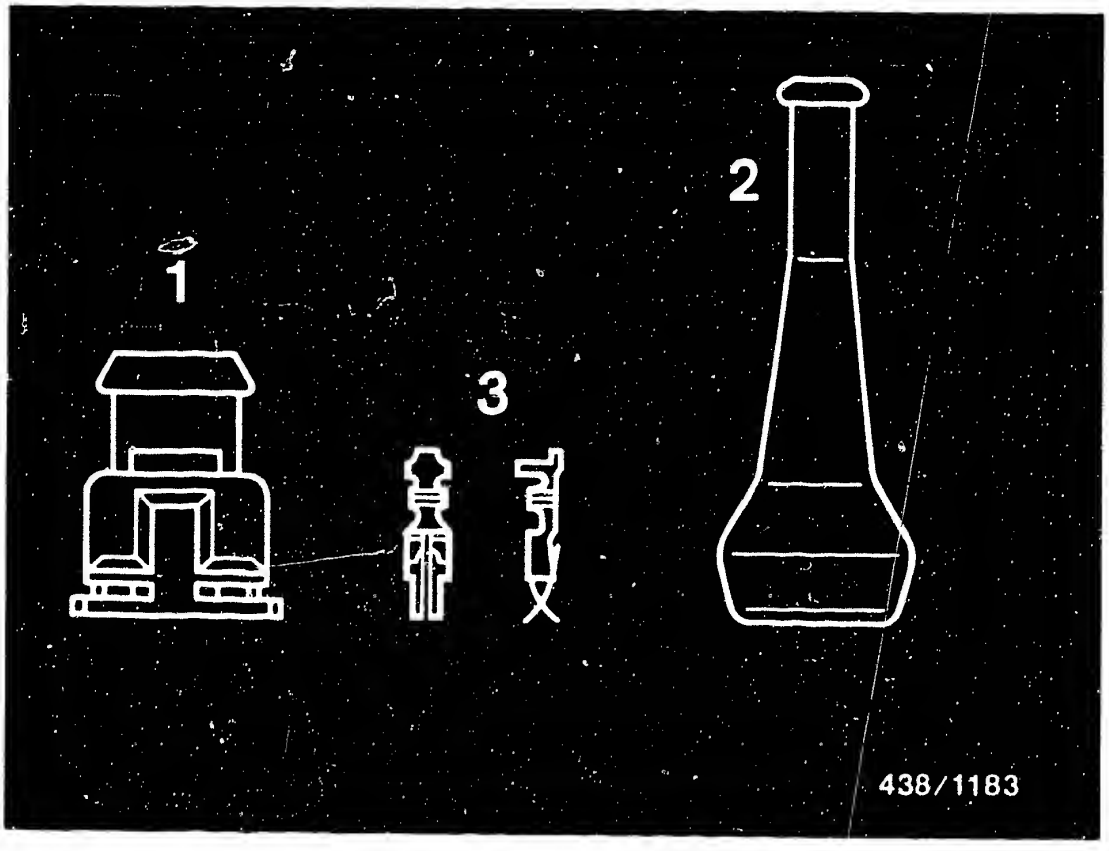


1 = Connection for inlet (M 10 x 1)
2 = Connection for return (M 8 x 1)
3 = Electrical connection

Version of warm-up regulator (continued):

Warm-up regulator 0 438 140 129:

This warm-up regulator is the replacement for the no longer available versions 0 438 140 001 and .. 008. It corresponds to the basic version, i. e. apart from the cold and warm control pressures it has no further functions.

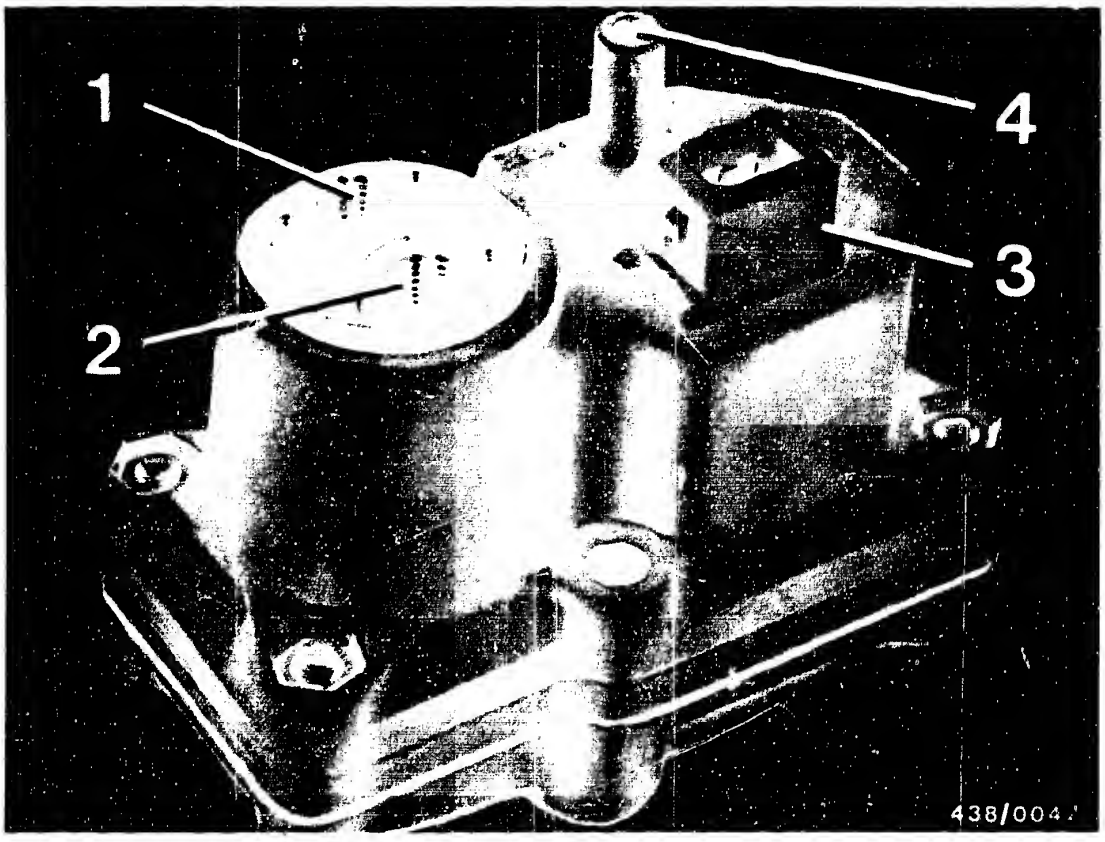


Included with warm-up regulator 0 438 140 129 are two screw-in tailpieces for the connection of the existing hose lines.

To install the warm-up regulator, it is necessary to make the now customary twin electrical connection. For this, the following are required:

1 = 1 plug housing assembly:	1 284 485 070
2 = 1 protective cap:	1 280 703 031
3 = 2 contacts:	1 284 477 026

The plug housing can be connected up either way round since both connections of the warm-up regulator are insulated.

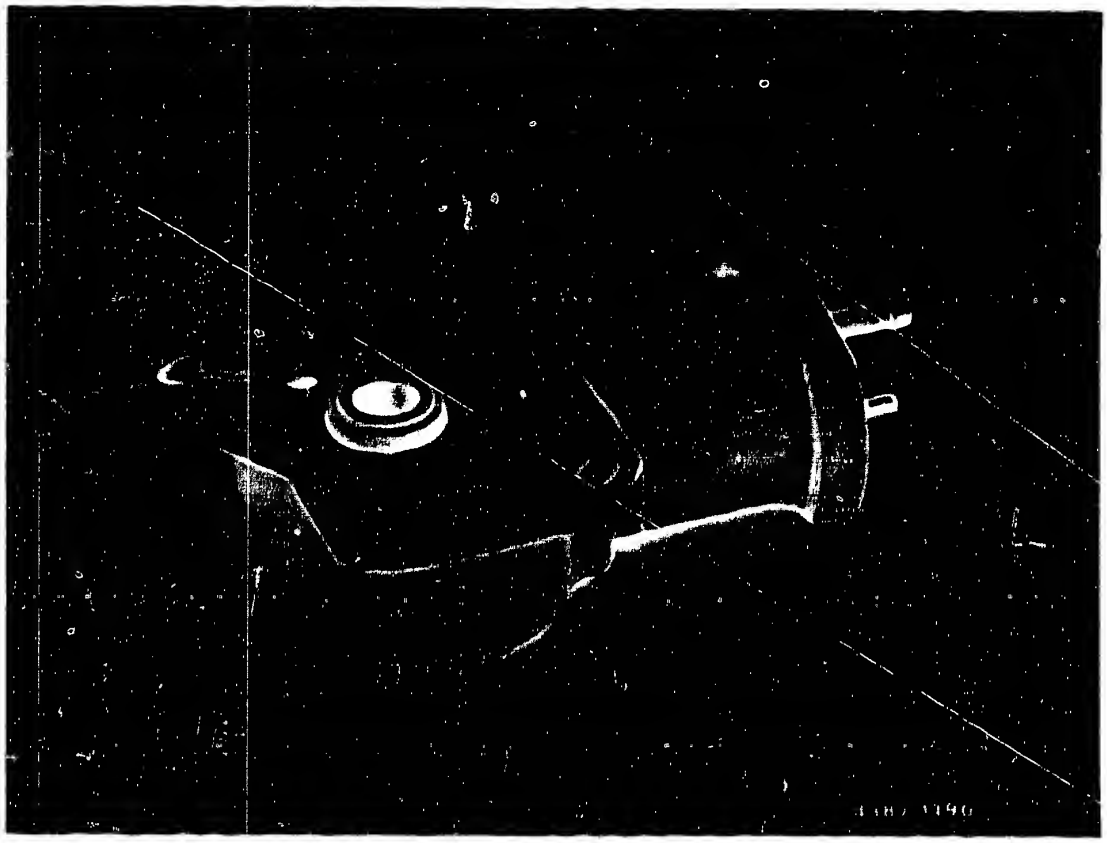


1 = Return port (M 8 x 1)
2 = Inlet port (M 10 x 1)
3 = Electric terminal
4 = Intake-manifold-pressure connection port (after throttle valve)

Version of warm-up regulator (continued)

Warm-up regulator 0 438 140 009 (model 75-USA):

The warm-up regulator is a version for intake-manifold-pressure-controlled full-load enrichment. This means that the cold and warm control pressures are additionally influenced by the intake-manifold pressure acting on the full-load diaphragm of the warm-up regulator. The intake-manifold pressure connection port (4) is located on the top of the housing cover. In the base plate there is an opening for atmospheric pressure.



14.3 Throttle-actuated valve 0 438 160 001 (911 T, 911, 911 S up to 74 model and 75 model except USA):

Operation of throttle-actuated valve:

The throttle-actuated valve is connected hydraulically in parallel with the warm-up regulator. It is mounted on the throttle-valve assembly by two screws and is actuated by the throttle shaft. The internal valve insert is the same as that of the warm-up regulator.

In the valve housing there is a disc cam which is turned by the throttle shaft. The valve spring lies by way of a ball on the path of the cam. Thus, depending on the throttle position, there is a change of the valve spring preload, and this results in a change of pressure.

The path of the cam is designed so that there are the following pressures:

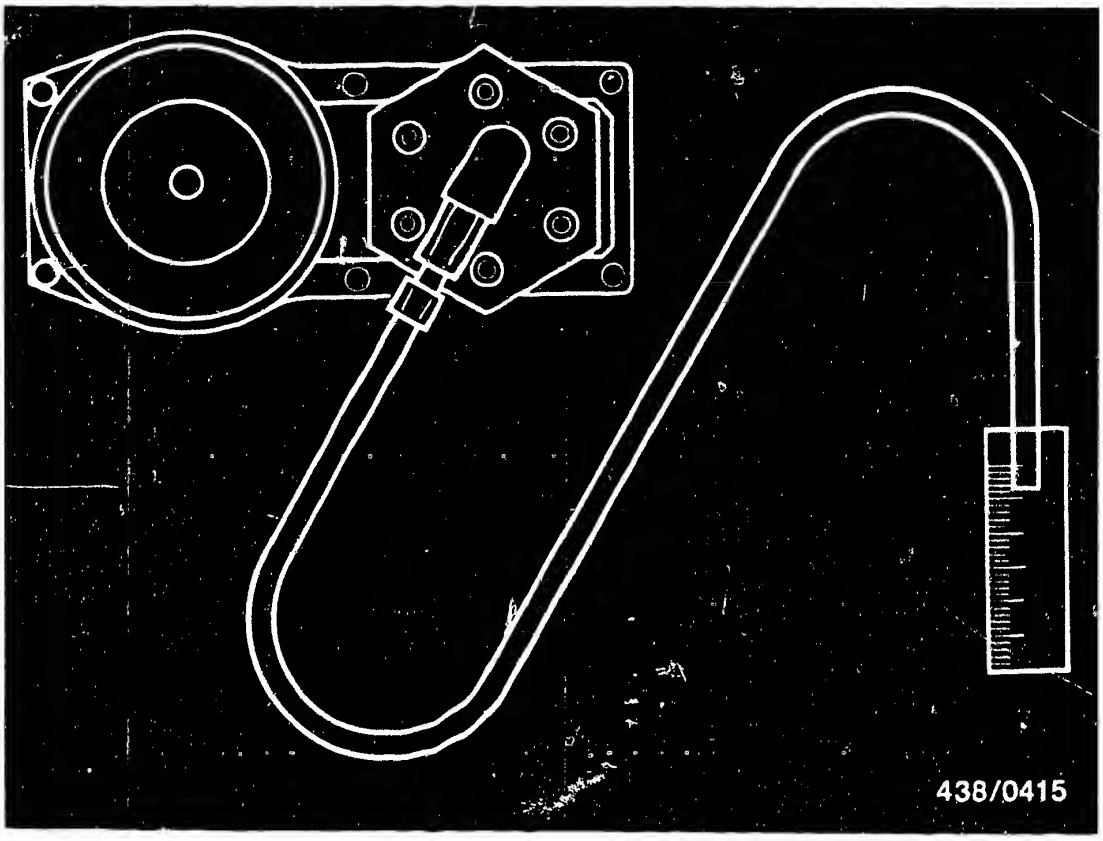
idle = approx. 2.9 bar
part load = approx. 4.1 bar
full load = approx. 2.8 bar

The parallel connection of the throttle-actuated valve with the warm-up regulator means that in the control-pressure circuit there is always a pressure which corresponds to the lowest-set pressure regulator:

"cold" control pressure (below 2.5 bar): determined by warm-up regulator

"warm" control pressure (above 2.5 bar): determined
at idle: by throttle-actuated valve
at part load: by warm-up regulator
at full load: by throttle-actuated valve

The idle value is adjustable by turning the throttle-actuated valve in the area of the slots.



14.4 Checking the fuel delivery for the control-pressure circuit:

Before testing, make sure that the electric fuel pump is operating properly.
Test specification: min. 930 cm^3/30 s.

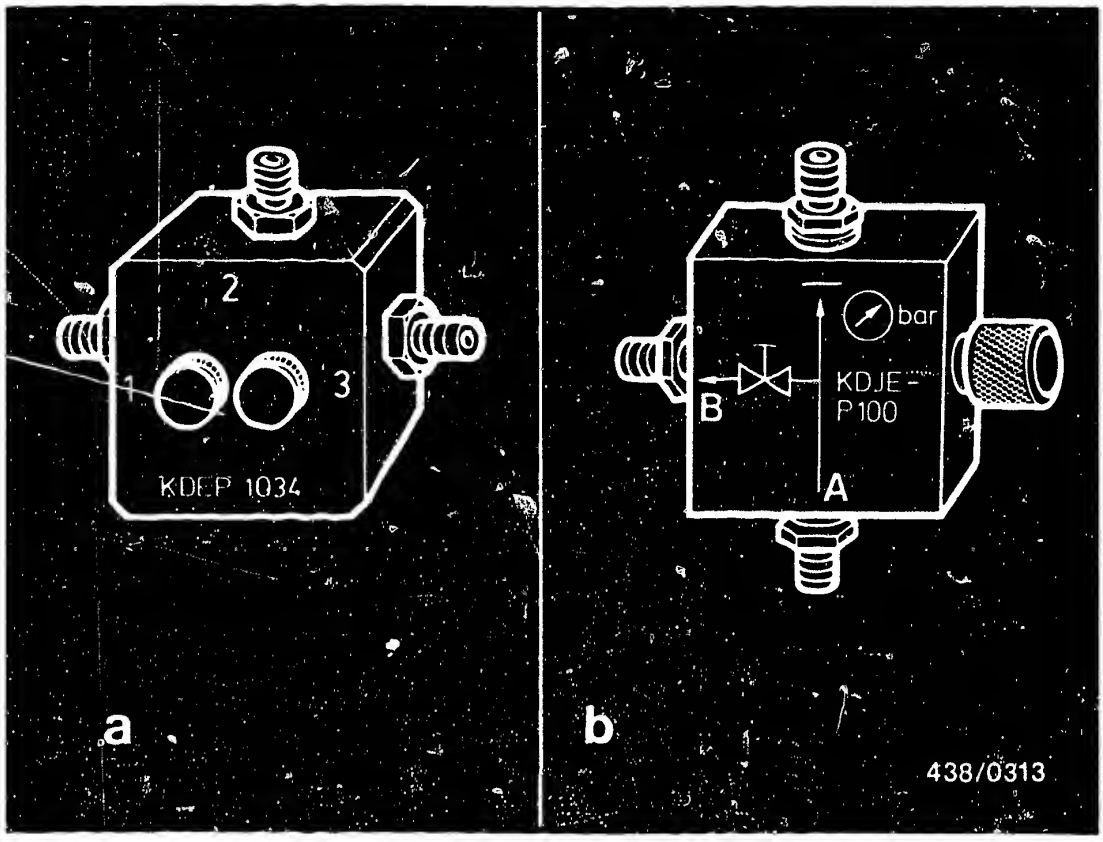
Unscrew control-pressure lines (to warm-up regulator and throttle-actuated valve) on the fuel distributor and screw connecting part (thread M 8 x 1/M 12 x 1.5) from connecting-parts set KDJE-P 100/10 into the control-pressure connection port.

Connect one of the two connecting hoses of the pressure tester KDJE-P 100 (previously KDEP 1034) to the control-pressure port of the fuel distributor (threads M 12 x 1.5) and hold hose in graduate (approx. 0.5 litre capacity).

Switch on the electric fuel pump for precisely 1 minute by switching on the ignition and measure the fuel delivery.

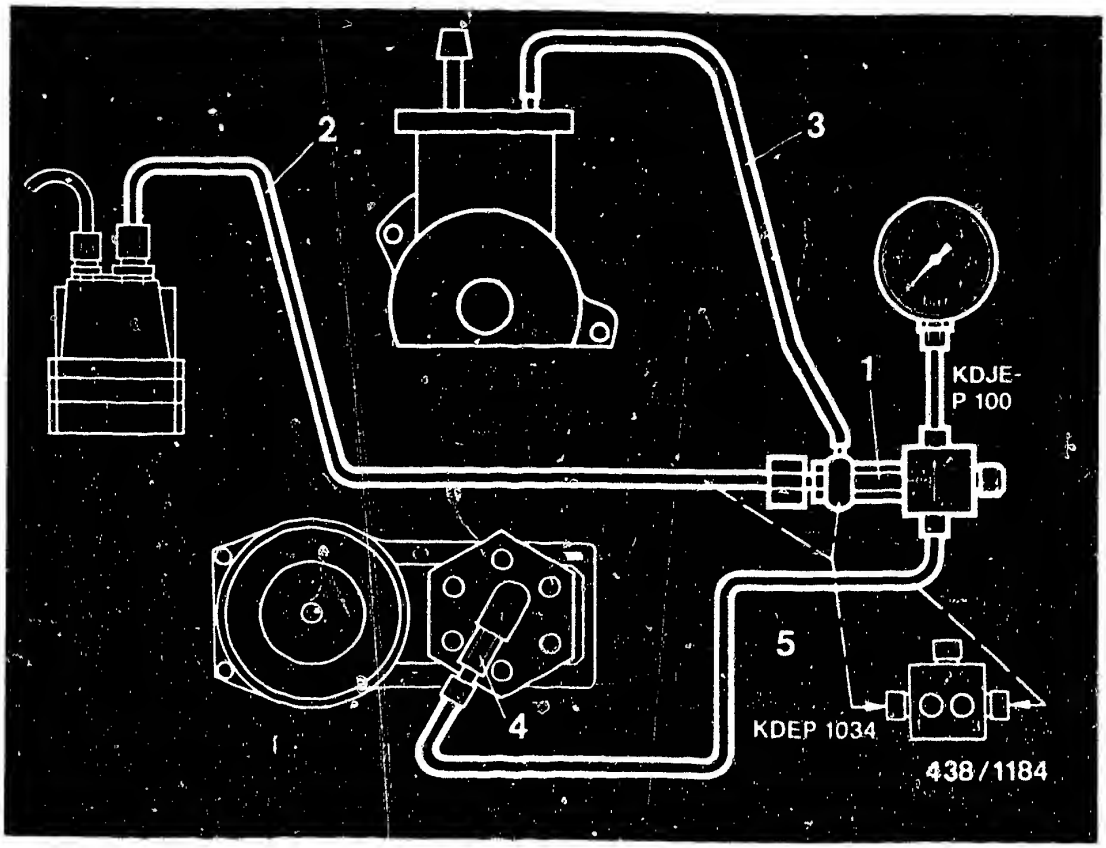
Test specification: 160...240 cm^3/min.

If the measured value is outside tolerance, the fault is in the fuel distributor.
Replace the fuel distributor.



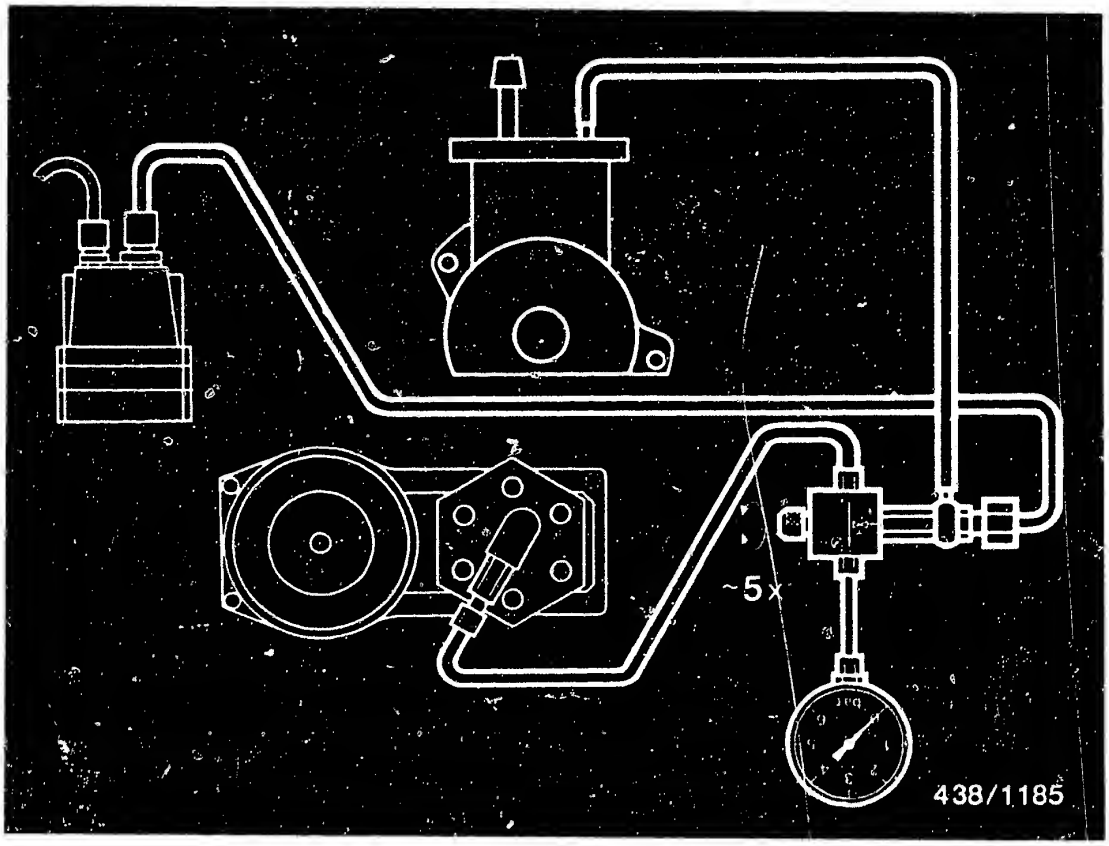
14,5 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator
Caution: throttle-actuated valve)
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



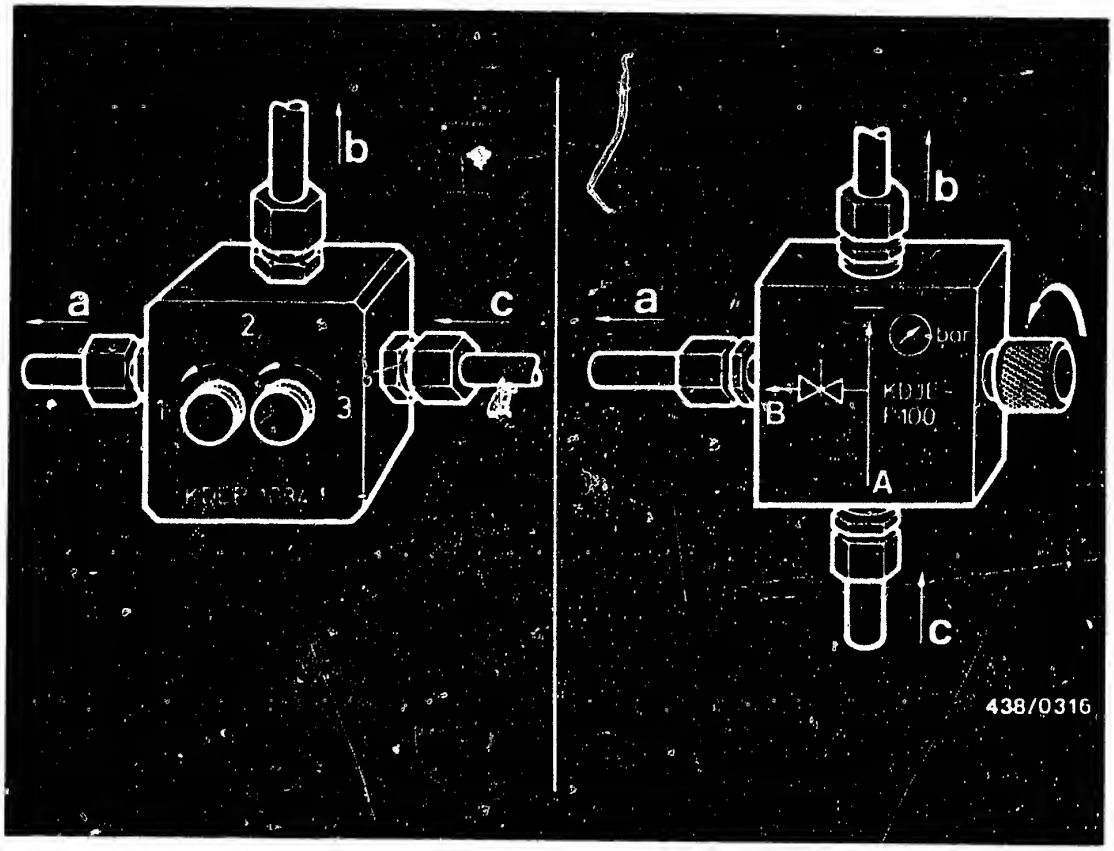
The directional-control valve is connected into the control-pressure line(s) between fuel-distributor and warm-up regulator, and warm-up regulator and throttle-actuated valve. Mount using connecting-parts set KDJE-P 100/10.

Screw the adapter of the connecting-parts set with seal-ring (1) onto connection B or 1 of the directional-control valve. Unscrew control-pressure lines to warm-up regulator (2) and throttle-actuated valve (3) on fuel distributor and connect with the original inlet-union screw to the adapter. Screw tube fitting of connecting-parts set into control-pressure connection port of fuel distributor (4), and connect by means of hose line (5) to connection A or 3 of directional-control valve.



14.6 Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on electric fuel pump by switching on the ignition.
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



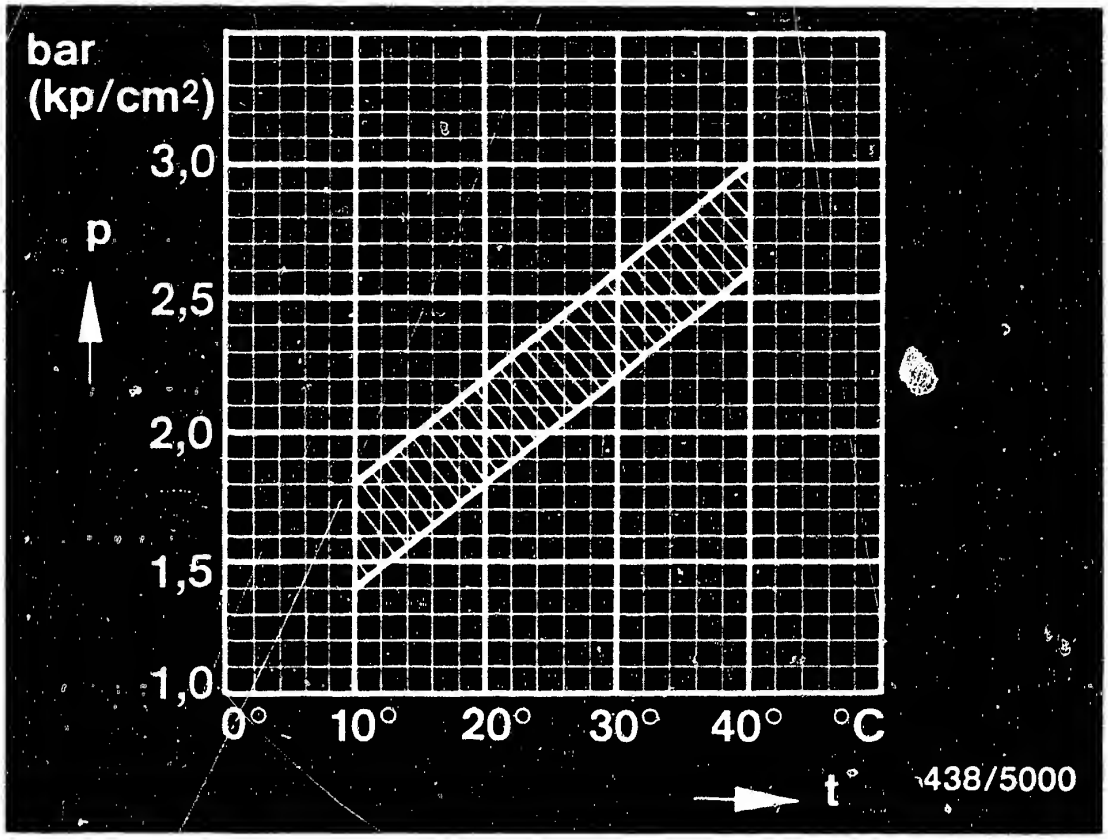
a = To warm-up regulator and throttle-actuated valve
b = To pressure gauge
c = From warm-up regulator

14.7 Checking the "cold" control pressure in vehicles with throttle-actuated valve:

Warm-up regulator part number: 0 438 140 001
008
129

Throttle-actuated valve part number: 0 438 160 001

The test is performed with the engine stopped. The engine must be cold. The vehicle should have been switched off for several hours, preferably overnight.
Disconnect plug from warm-up regulator.
Open hollow screw of directional-control valve (both screws in the case of KDEP 1034). Switch on ignition so that electric fuel pump operates. "Cold" control pressure is indicated on pressure gauge.

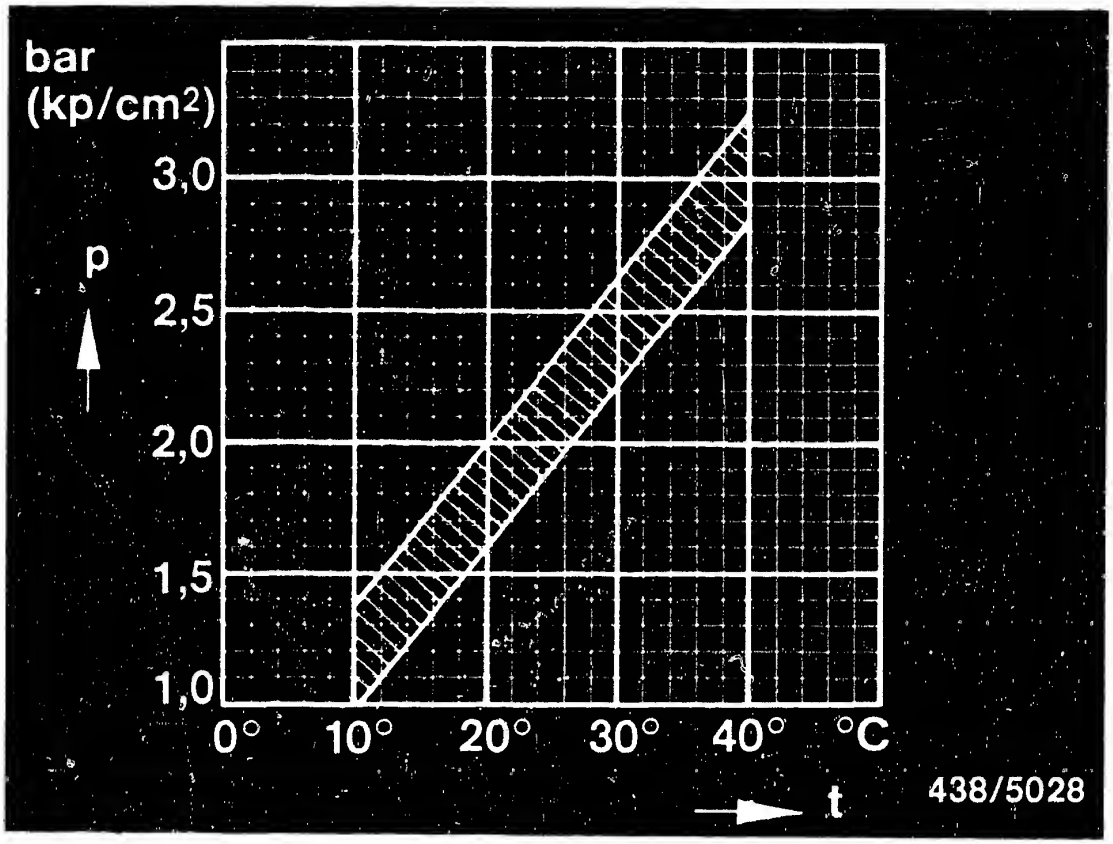


p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator Part No.: 0 438 140 001
(911 T 1.73 - 7.73)

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1,8...2,2 bar gauge pressure

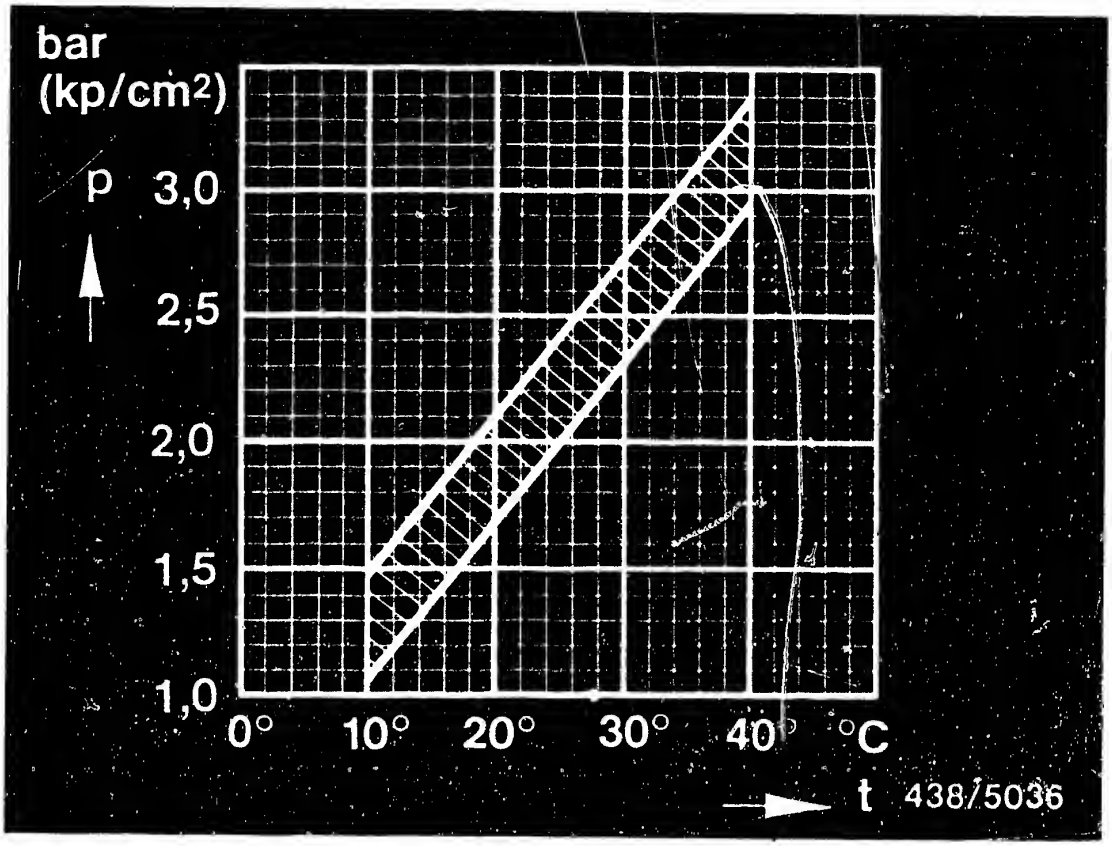


p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator Part No.: 0 438 140 008
(911, 911 S 8.73 - 7.75)

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1.6...2,9 bar gauge pressure



p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator·Part No.: 0 438 140 129

(Replacement version for the no longer available warm-up regulators 0 438 140 001 and .. 008)

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = 1,7...2,1 bar gauge pressure

If the measured "cold" control pressure differs from the nominal value, this may be due to one of the following faults:

- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.

  Test value: 160...240 cm^3/min.

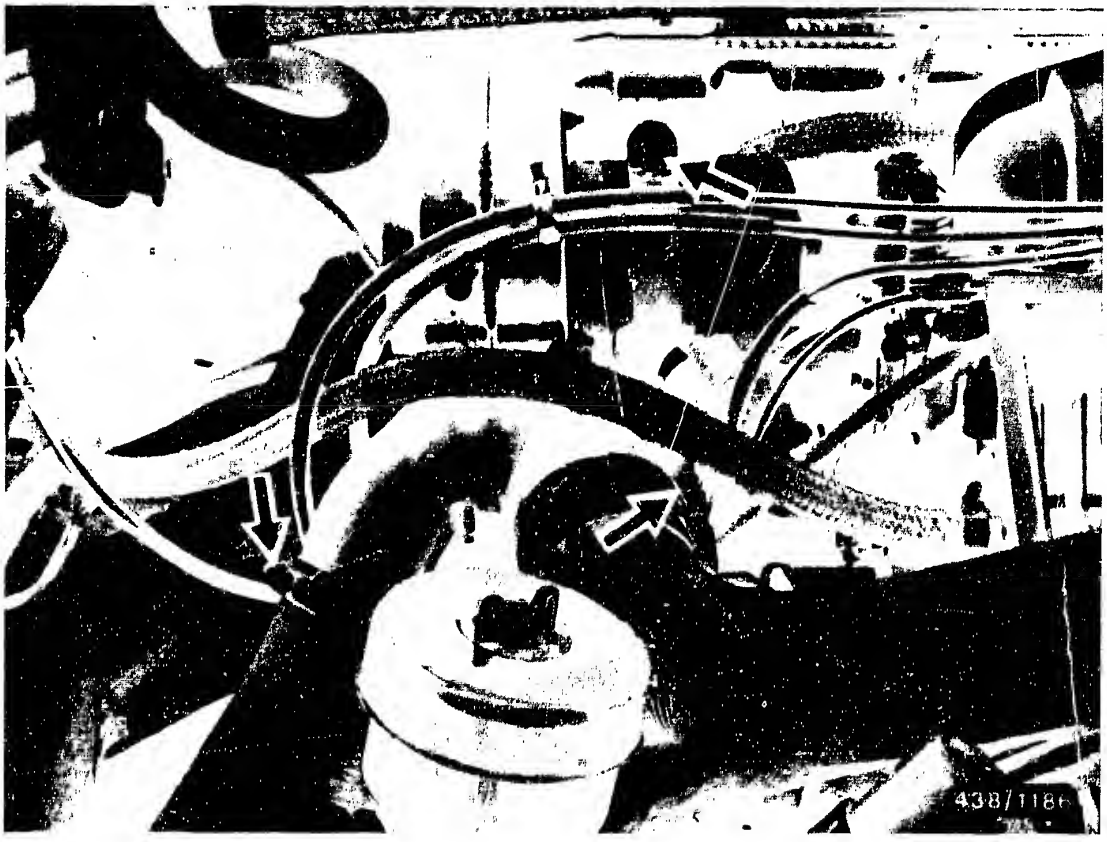
- Fuel return from warm-up regulator blocked or constricted (if control pressure too high). Eliminate restriction.

- Throttle-actuated valve leaking badly (if control pressure too low). For testing, pinch off return line of throttle-actuated valve. If the measurement result is now O.K., replace throttle-actuated valve.

- Warm-up regulator defective. Replace warm-up regulator.

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

Idle adjustment is described on Coordinate H 11



14.8 Removing and installing the warm-up regulator:

There is no problem on the 73 and 74 models.

On the 75 model with auxiliary blower, loosen the three clamping screws (identified by arrows) and disconnect the two air hoses from the distributor piece. Turn the blower motor upward with distributor piece so that the warm-up regulator becomes accessible.

Notes for installing warm-up regulator 0 438 140 129 (replacement for .. 001 and .. 008):

Remove the old warm-up regulator complete with control-pressure line (to fuel distributor).

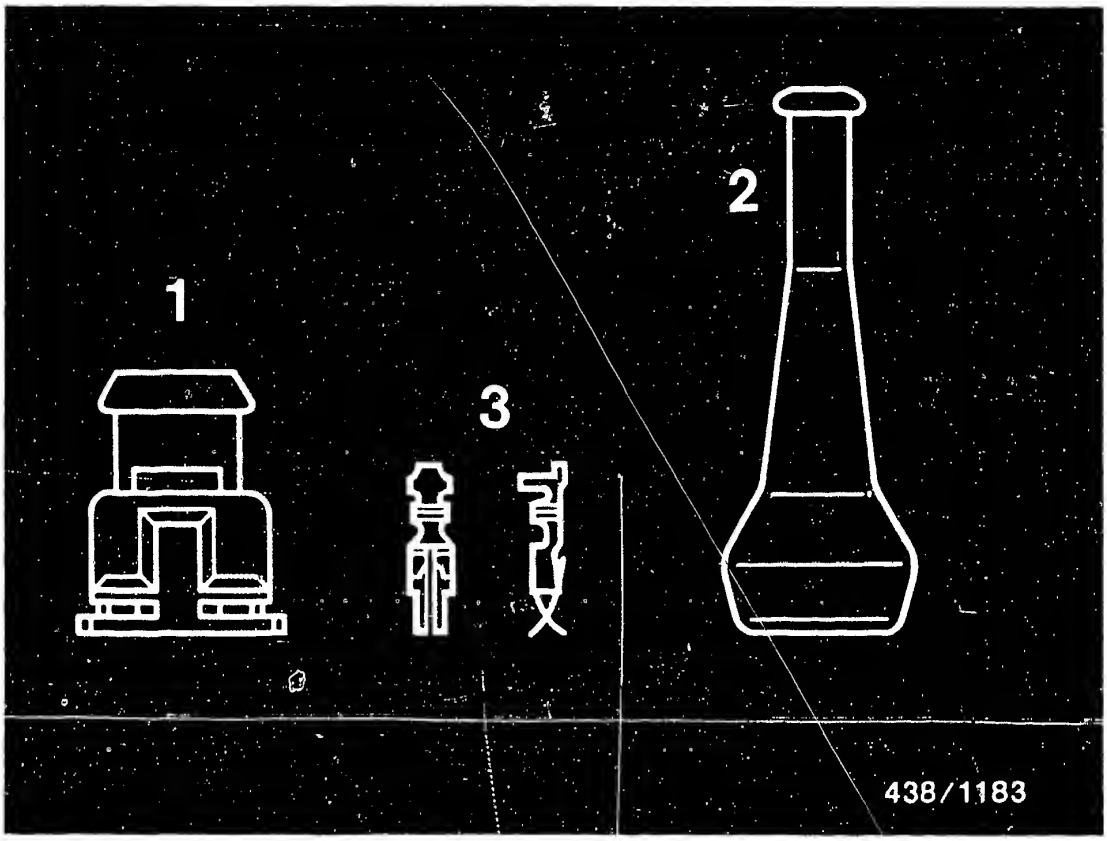
Cut off polyamide line on auxiliary fitting of old warm-up regulator. Insert the line into assembly tool KDEP 1039 so that it projects by the length of the fitting.

Using the assembly tool, press the polyamide line cold onto the inlet fitting of the new warm-up regulator.

Caution: Do not heat up the line for assembling since it will undergo permanent expansion and this will lead to leaks.

Re-install the warm-up regulator. Connect the inlet line to the fuel distributor and the return line to the fitting of the warm-up regulator. Securely tighten the hose binder on the return line.

Reinstall the auxiliary blower (75 model) properly.



When installing the new warm-up regulator, it is also necessary to convert the electrical connection to the now customary 2-pole version. The following are required for this:

1 = 1 plug housing assembly:	1 284 485 070
2 = 1 protective cap:	1 280 703 031
3 = 2 contacts:	1 284 477 026

The plug housing may be connected either way round since both connections of the warm-up regulator are insulated.

14.9 Removing and installing the throttle-actuated valve:

Remove the complete throttle-valve assembly from the air-intake housing so that, after unscrewing the two fastening screws, the throttle-actuated valve can be removed and remounted on the throttle shaft.

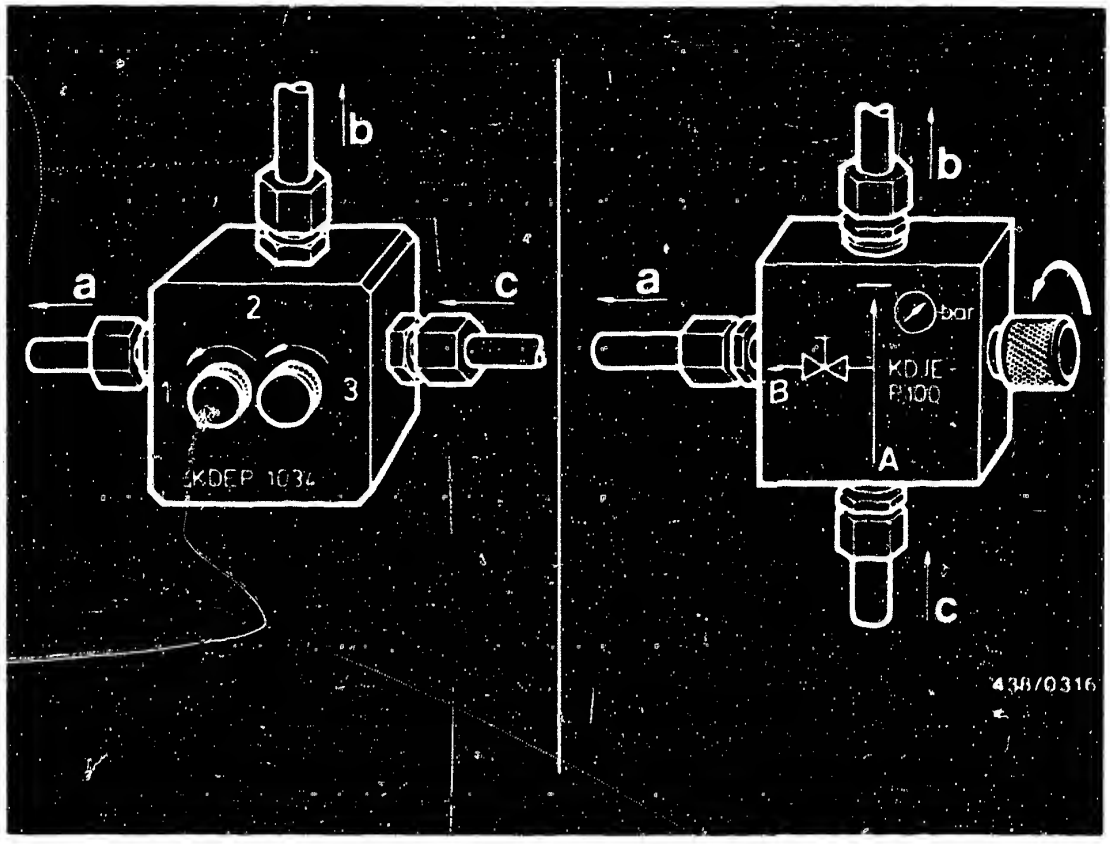
After installing the new throttle-actuated valve and the complete throttle-valve assembly, set the control-pressure idle value as follows:

The pressure tester is still connected. Open the hollow screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the ignition so that the electric fuel pump operates. Connect the plug to the warm-up regulator and wait until the warm-up regulator has shut off.
With the throttle in the idle position, adjust the throttle-actuated valve in the area of the slots so that there is a control pressure of

2.85 ... 2.95 bar (2.95 ... 3.05 kgf/cm²) (gauge pressure).

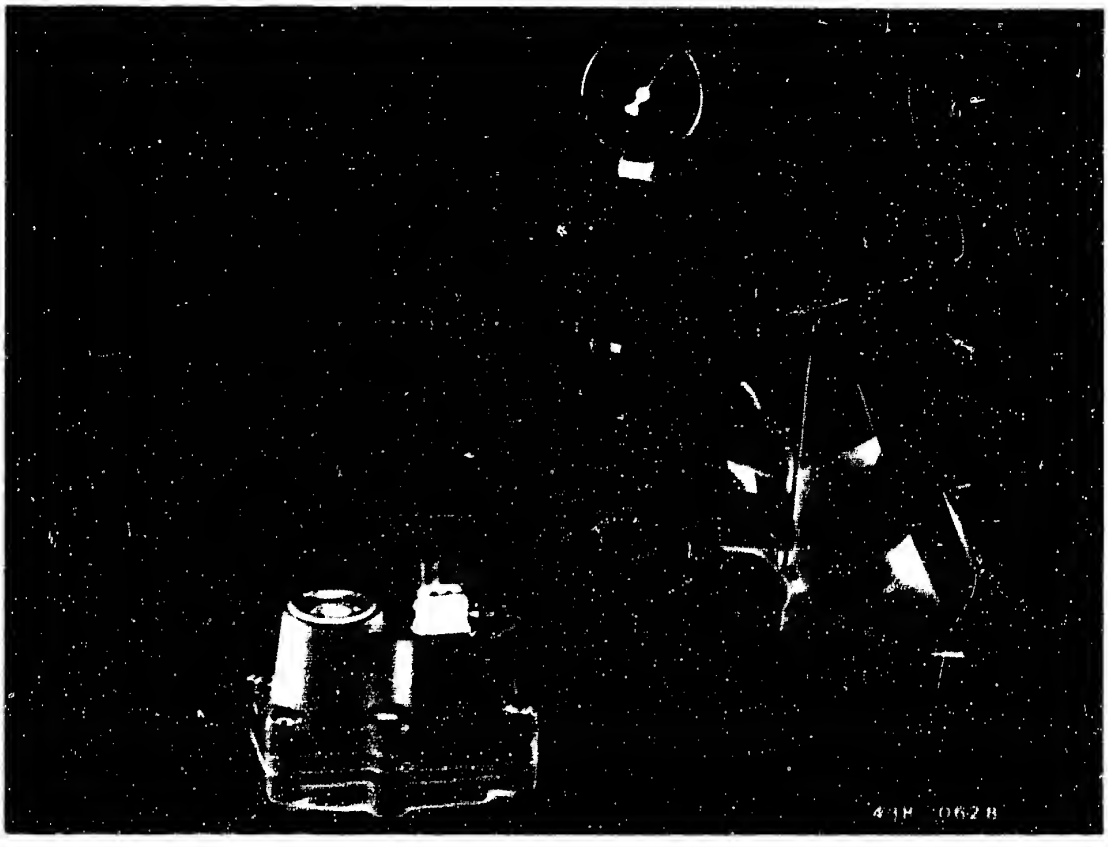
Finally, securely tighten both fastening screws.



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.10 Testing the "cold" control pressure on warm-up regulator with manifold-pressure-dependent full-load enrichment (vehicles without throttle-actuated valve, models 911, 911 S as of 8.74, USA version):

Warm-up regulator part number: 0 438 140 009
The test is performed with the engine stopped. The engine must be cold. The vehicle should have been stopped for several hours, preferably overnight. Disconnect the plug from the warm-up regulator. Open the hollow screw of the directional-control valve (both screws in the case of KDEP 1034). Switch on the ignition so that the electric fuel pump operates.

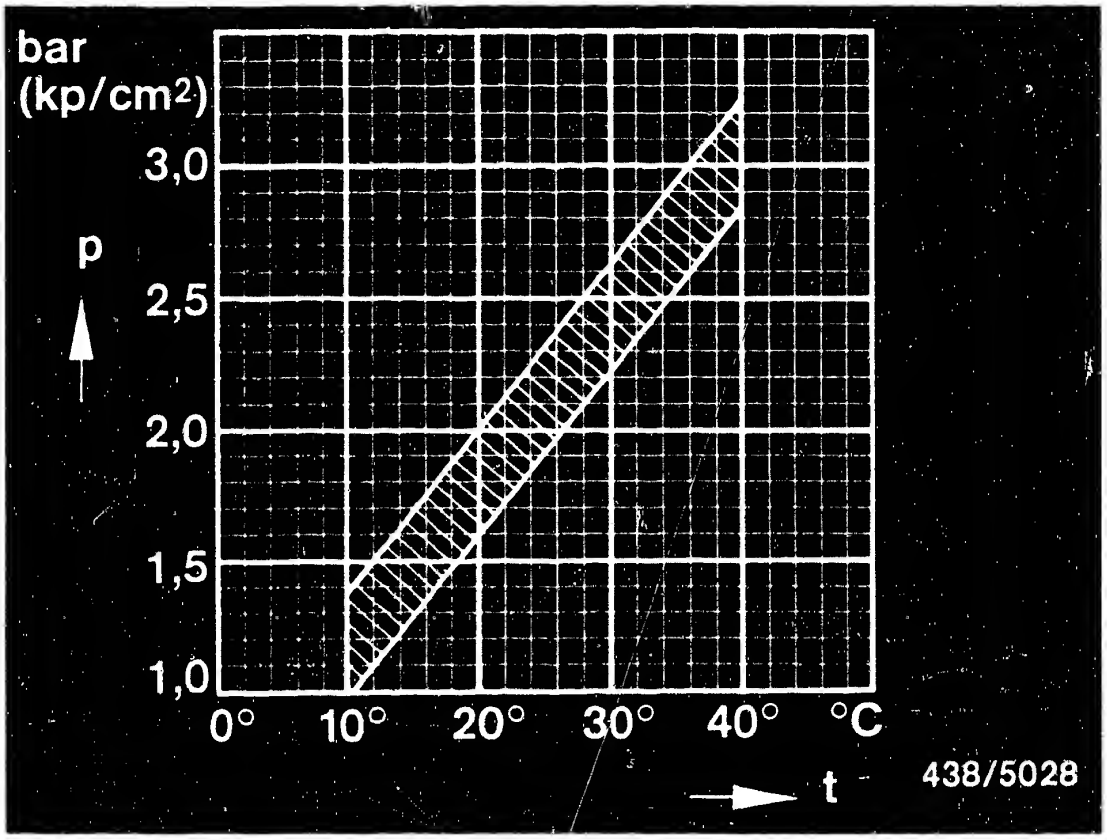


The control pressure is tested with simulated intake-manifold pressure, i.e. by applying vacuum to the warm-up regulator.

To do this, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator on the top of the housing. The picture shows testing with the recommended Mityvac hand vacuum pump.

Setting value for testing: 520...546 mbar
(390...410 mmHg)

The "cold" control pressure is indicated on the pressure gauge of the pressure tester.



p = Control pressure (bar or kgf/cm² gauge pressure)
t = Ambient temperature (°C)

Warm-up regulator·Part No.: 0 438 140 009

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20°C
Nominal control pressure = $\frac{1,6...2,0\ \text{bar}}{\text{gauge pressure}}$

If the measured "cold" control pressure differs from the nominal value, this may be due to one of the following faults:

- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.

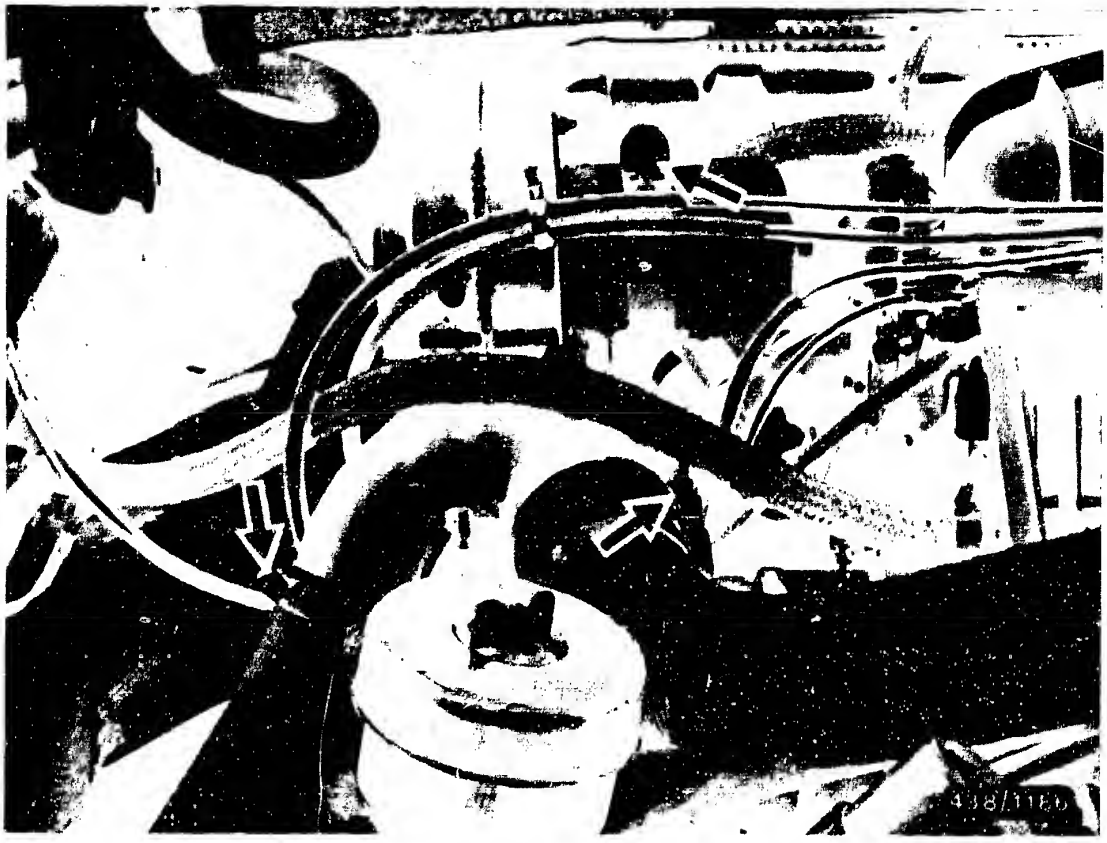
  Test value: 160...240 cm^3/min.

- Fuel return from warm-up regulator blocked or constricted (if control pressure too high).
  Eliminate restriction.

- Warm-up regulator defective.
  Replace warm-up regulator.

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

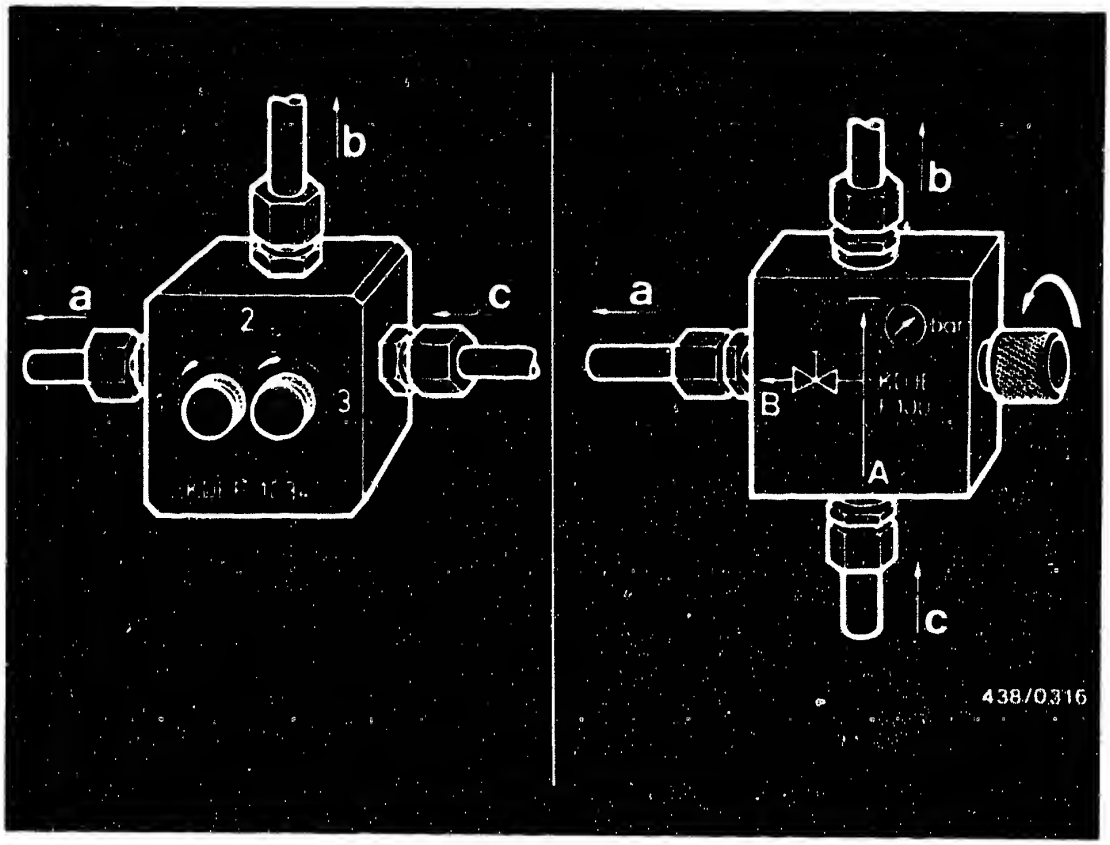
Idle adjustment is described on Coordinate H 11.



14.11 Removing and installing the warm-up regulator:

On the 75 model with auxiliary blower, loosen the three clamping screws (identified by arrows) and disconnect the two air hoses from the distributor piece. Turn the blower motor upward with distributor piece, so that the warm-up regulator becomes accessible.

After installing the new warm-up regulator, make sure that the vacuum line (throttle-valve assembly - warm-up regulator) is in good condition and is properly connected.



14.12 Testing the "warm" control pressure on vehicles with throttle-actuated valve

Warm-up regulator part number: 0 438 140 001
008
129

Throttle-actuated valve part number: 0 438 160 001

The test is performed with the engine stopped. Engine temperature is not important. Connect plug to warm-up regulator. Open hollow screw of directional-control valve (both screws in the case of KDEP 1034). Bridge the control relay of the warm-up regulator.
Switch on ignition so that electric fuel pump operates. Wait until warm-up regulator has shut off. Then test the control pressure at different throttle positions.

Test specifications for vehicles with warm-up regulator 0 438 140 001 and .. 008:

Throttle position:

- Idle: 2.8 ... 3.0 bar (2.9 ... 3.1 kgf/cm²)
- Part load (about half open): 3.4 ... 3.8 bar (3.5 ... 3.9 kgf/cm²)
- Full load (up to stop): 2.6 ... 3.0 bar (2.7 ... 3.1 kgf/cm²)

Test specifications for vehicles with warm-up regulator 0 438 140 129 (replacement for .. 001 and .. 008):

Throttle position:

- Idle: 2.8 ... 3.0 bar (2.9 ... 3.1 kgf/cm²)
- Part load (about half open): 3.25...3.65 bar (3.35...3.75 kgf/cm²)
- Full load (up to stop): 2.6 ... 3.0 bar (2.7 ... 3.1 kgf/cm²)

Pressures are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

If the measured values differ from the set value, this may be due to one of the following causes:

- All values outside tolerance:

  Fuel delivery for control-pressure circuit too low or too high. Measure fuel delivery at control-pressure connection port of fuel distributor.

  Test specification: 160 ... 240 cm^3/min.

- All values too high:

  Common fuel return line (after T-piece) to fuel tank constricted or blocked. Eliminate constriction.

- All values too low:

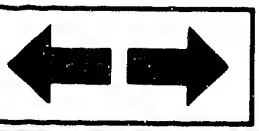
  Warm-up regulator not shutting off, due to open circuit or voltage drop. Minimum voltage across plug with electric fuel pump operating: 11.5 V.

  Warm-up regulator or throttle-actuated valve defective. For testing, pinch off the respective return hose.

- Only idle value outside tolerance:

  Throttle-actuated valve incorrectly set. Loosen both fastening screws and, with throttle in idle position, turn throttle-actuated valve to setting value:

  2.85 ... 2.95 bar (2.95 ... 3.05 kgf/cm^2) (gauge pressure)

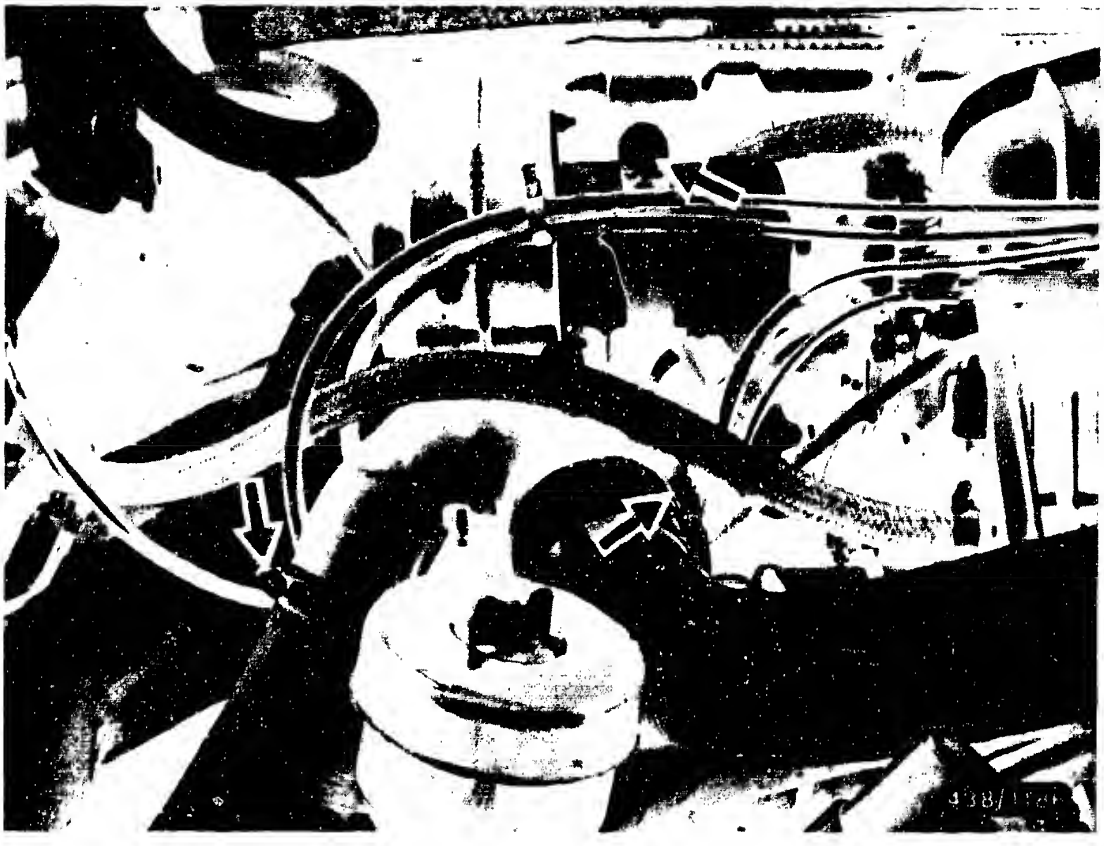


- Only part-load value outside tolerance:

  Constriction in warm-up regulator return line (if value too high) or warm-up regulator defective. Either eliminate constriction or replace warm-up regulator.

- Idle value and full-load value outside tolerance:

  Constriction in throttle-actuated valve return line (if value too high) or throttle-actuated valve defective. Eliminate constriction or replace throttle-actuated valve.



14.13 Removing and installing the warm-up regulator:

There is no problem on the 73 and 74 models.

On the 75 model with auxiliary blower, loosen the three clamping screws (identified by arrows) and disconnect the two air hoses from the distributor piece. Turn the blower motor upward with distributor piece so that the warm-up regulator becomes accessible.

Notes for installing warm-up regulator 0 438 140 129 (replacement for .. 001 and .. 008):

Remove the old warm-up regulator complete with control-pressure line (to fuel distributor).

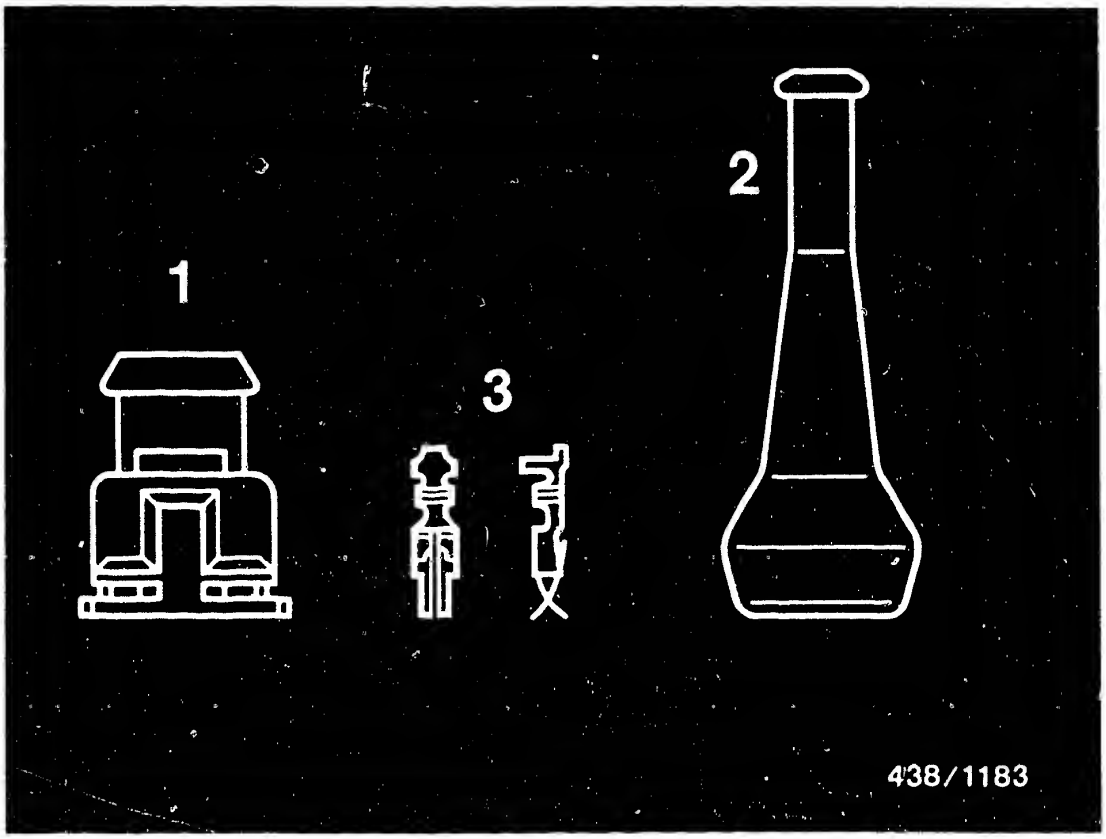
Cut off polyamide line on auxiliary fitting of old warm-up regulator. Insert the line into assembly tool KDEP 1039 so that it projects by the length of the fitting.

Using the assembly tool, press the polyamide line cold onto the inlet fitting of the new warm-up regulator.

Caution: Do not heat up the line for assembling since it will undergo permanent expansion and this will lead to leaks.

Re-install the warm-up regulator. Connect the inlet line to the fuel distributor and the return line to the fitting of the warm-up regulator. Securely tighten the hose binder on the return line.

Reinstall the auxiliary blower (75 model) properly.



Included with warm-up regulator 0 438 140 129 are two screw-in tailpieces for the connection of the existing hose lines.

To install the warm-up regulator, it is necessary to make the now customary twin electrical connection. For this, the following are required:

1 = 1 plug housing assembly:	1 284 485 070
2 = 1 protective cap:	1 280 703 031
3 = 2 contacts:	1 284 477 026

The plug housing can be connected up either way round since both connections of the warm-up regulator are insulated.

14.14 Removing and installing the throttle-actuated valve:

Remove the complete throttle-valve assembly from the air-intake housing so that, after unscrewing the two fastening screws, the throttle-actuated valve can be removed and remounted on the throttle shaft.

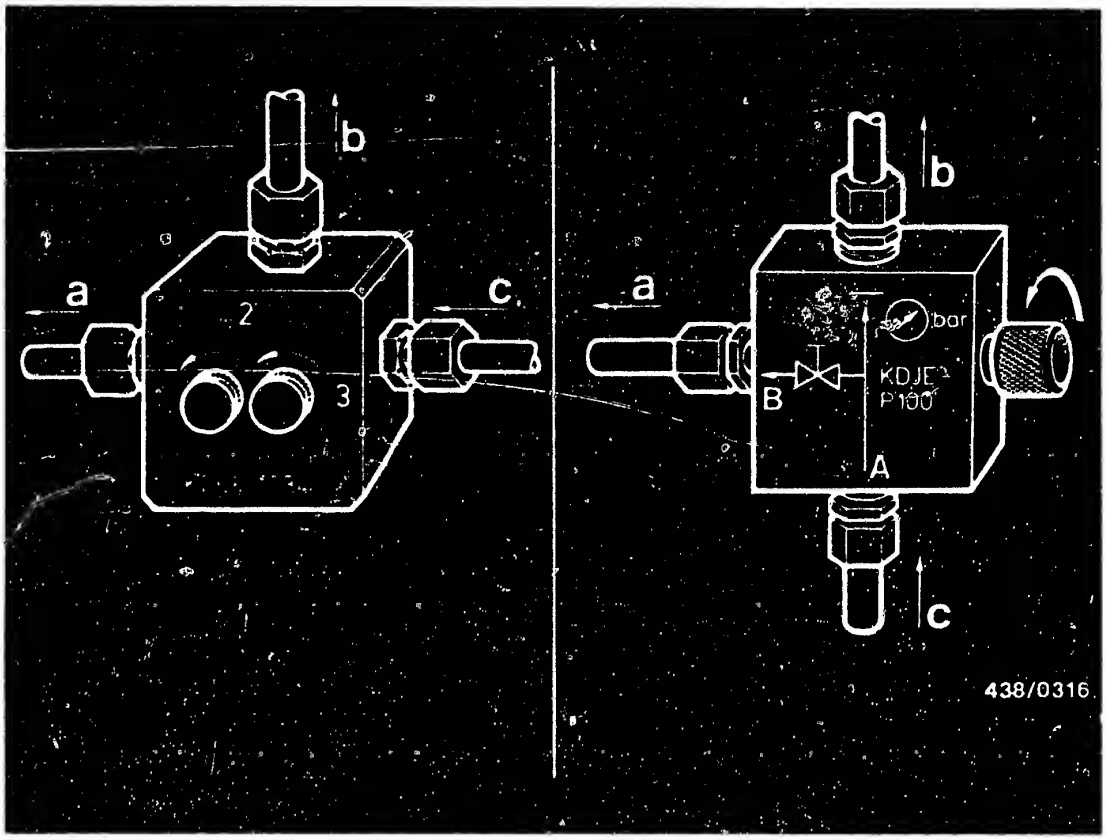
After installing the new throttle-actuated valve and the complete throttle-valve assembly, set the control-pressure idle value as follows:

The pressure tester is still connected. Open the hollow screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the ignition so that the electric fuel pump operates. Connect the plug to the warm-up regulator and wait until the warm-up regulator has shut off.
With the throttle in the idle position, adjust the throttle-actuated valve in the area of the slots so that there is a control pressure of

2.85 ... 2.95 bar (2.95 ... 3.05 kgf/cm²) (gauge pressure)

Finally, securely tighten both fastening screws.



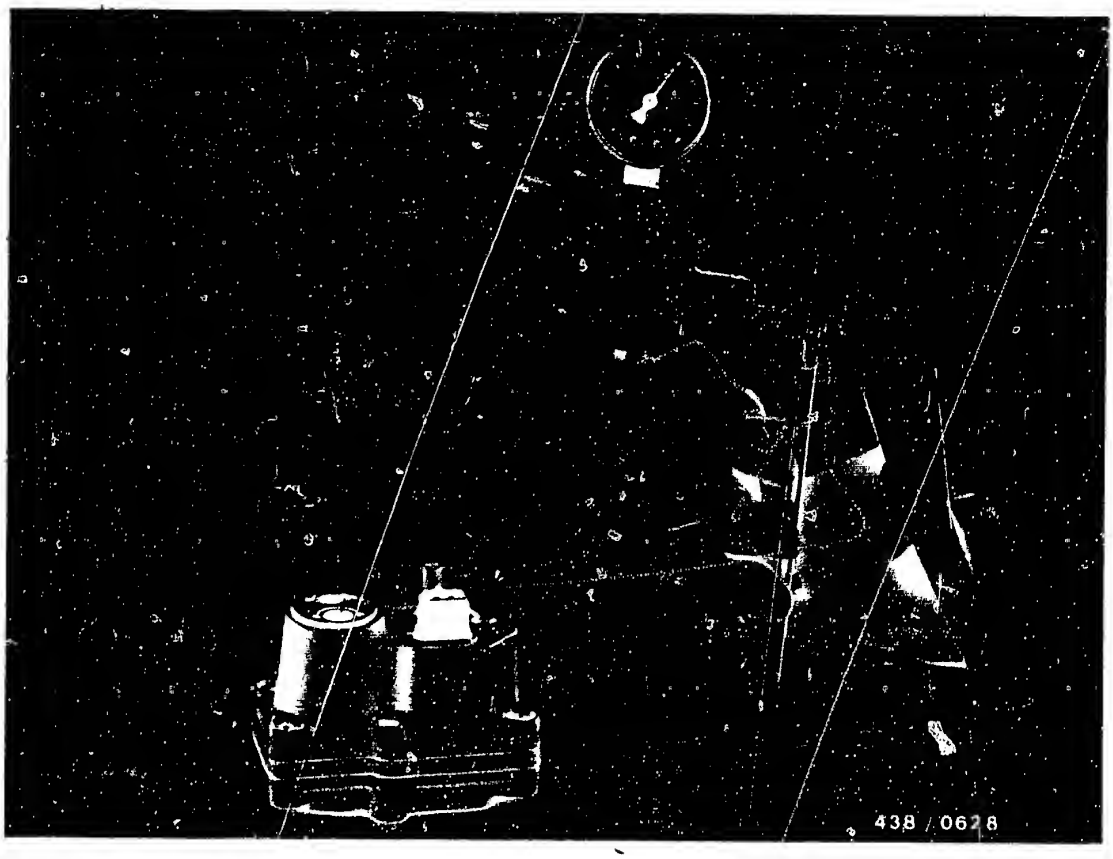
a = to warm-up regulator
b = to pressure gauge
c = from fuel distributor

14.15 Testing the "warm" control pressure on warm-up regulator with manifold-pressure-controlled full-load enrichment (vehicles without throttle-actuated valve, models 911, 911 S as of 8.74, USA version):

Warm-up regulator part number: 0 438 140 009.

Engine temperature is not important.

The test is performed with the engine stopped, once without application of manifold pressure, and once with simulated manifold pressure (vacuum).
Open hollow screw of directional-control valve (both screws in the case of KDEP 1034).



For testing with simulated intake-manifold pressure, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator (on the top of the housing near the plug housing).
The picture shows testing with the recommended Mityvac hand pump.

Setting value for testing: 520...546mbar (390...410 mmHg)

Testing:

Engine temperature is not important.

Open hollow screw of directional-control valve (both screws in the case of KDEP 1034).
Switch on electric fuel pump by switching on ignition.

Connect plug to warm-up regulator.
Bridge control relay of warm-up regulator.
Control pressure now rises (warm-up regulator in the process of shutting off) until "warm" control pressure is reached.

Firstly, perform test without application of manifold pressure, then with simulated manifold pressure (vacuum) according to the following values:

Test step	Test specifications*
• Control pressure "warm" Test with atmospheric pressure (without vacuum)	2.7 ... 3.1 bar (2.8 ... 3.2 kgf/cm²)
For testing, connect vacuum pump to manifold-pressure connection of warm-up regulator. Setting value: 520...546 mbar (390...410 mmHg)	3.4 ... 3.8 bar (3.5 ... 3.9 kgf/cm²)
• Leak test on full-load diaphragm: Max. pressure drop from "setting value":	100 mbar(75mmHg)/15s

* Pressures in the test specifications are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel delivery for control-pressure circuit too high. Test fuel delivery at control-pressure connection port of fuel distributor.
  Test specification: 160 ... 240 cm^3/min.

- Fuel return from the warm-up regulator blocked or constricted. Eliminate constriction.

- Warm-up regulator has hydraulic defect.
  Replace warm-up regulator.

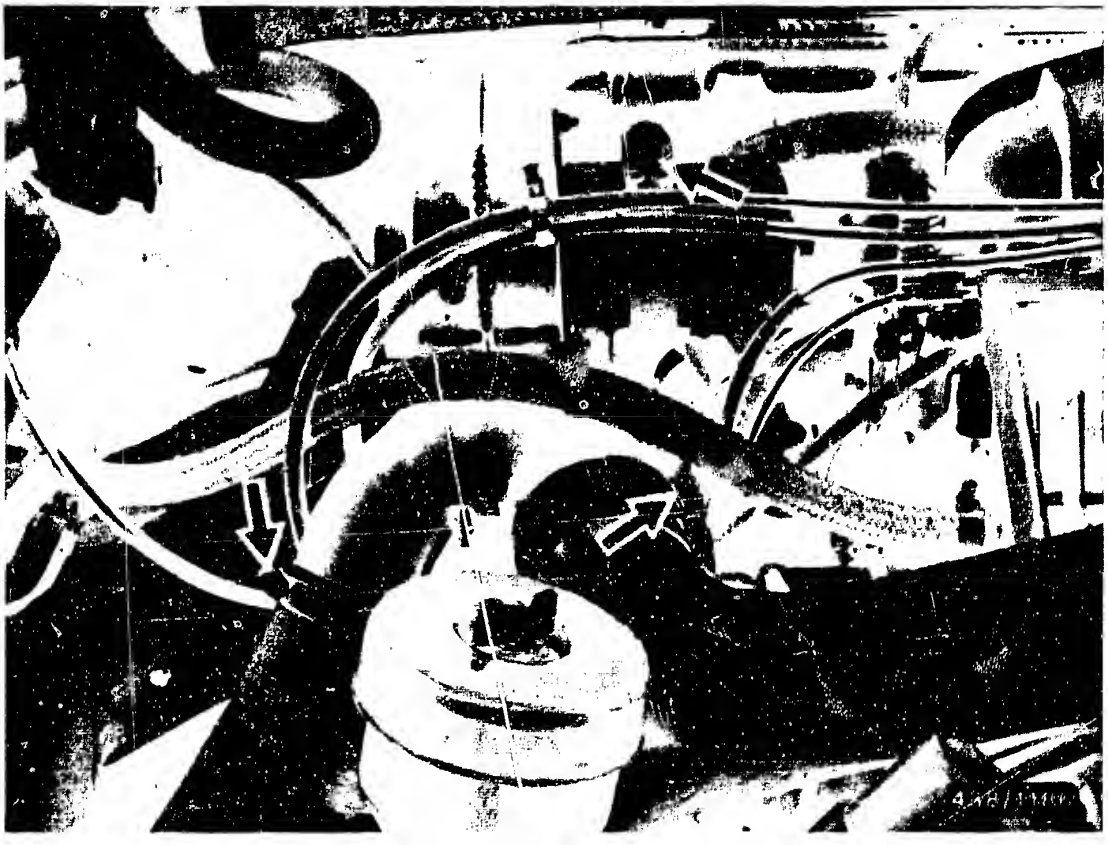
If control pressure too low:

- Power supply open-circuit.
  Eliminate open circuit. Ensure that the plug is contacting properly.

- Battery voltage too low, voltage drop.
  Eliminate voltage drop. Minimum voltage at connector: 11.5 V.
  If necessary, repeat test with engine running in order to obtain the normal generator voltage of approx. 14 V when the vehicle is in operation.

- Fuel delivery for the control-pressure circuit too low. Test fuel delivery at control-pressure connection port of fuel distributor.
  Test specification: 160...240 cm^3/min.

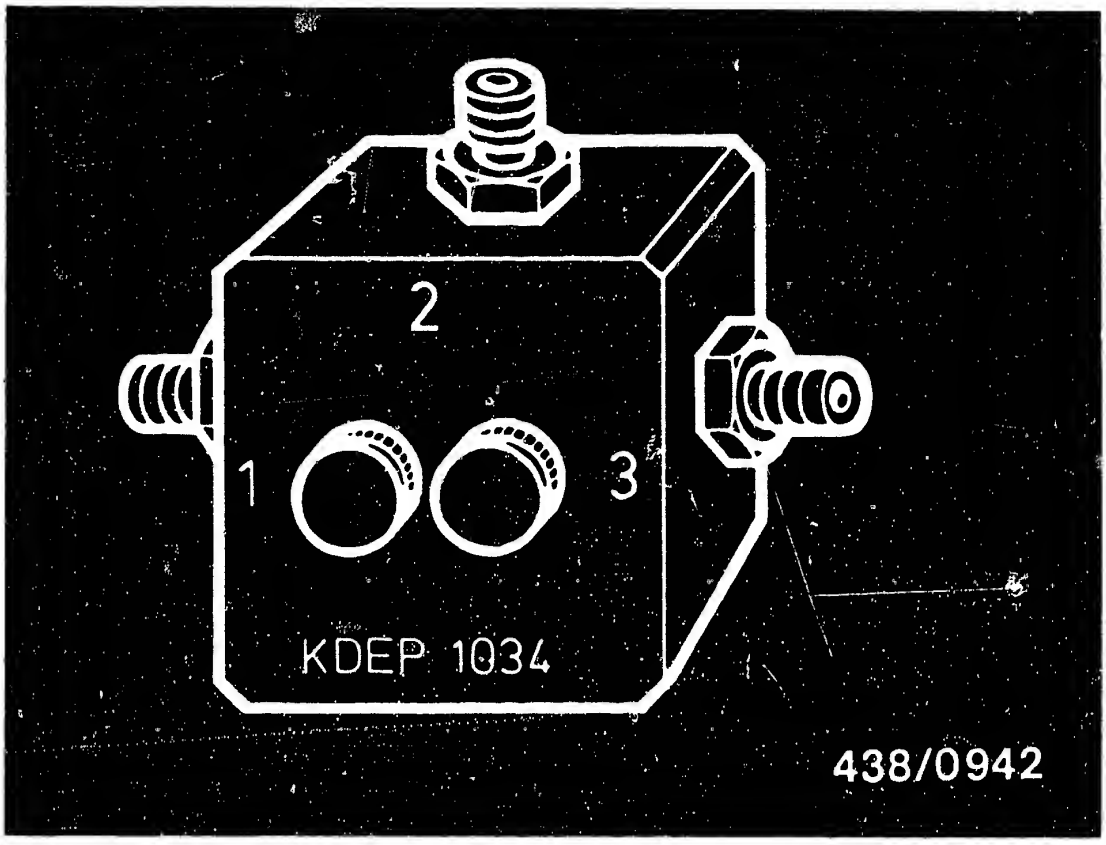
- Warm-up regulator defective. Heating coil open-circuit. Hydraulic defect. Replace warm-up regulator.



14.16 Removing and installing the warm-up regulator:

On the 75 model with auxiliary blower, loosen the three clamping screws (identified by arrows) and disconnect the two air hoses from the distributor piece. Turn the blower motor upward with distributor piece, so that the warm-up regulator becomes accessible.

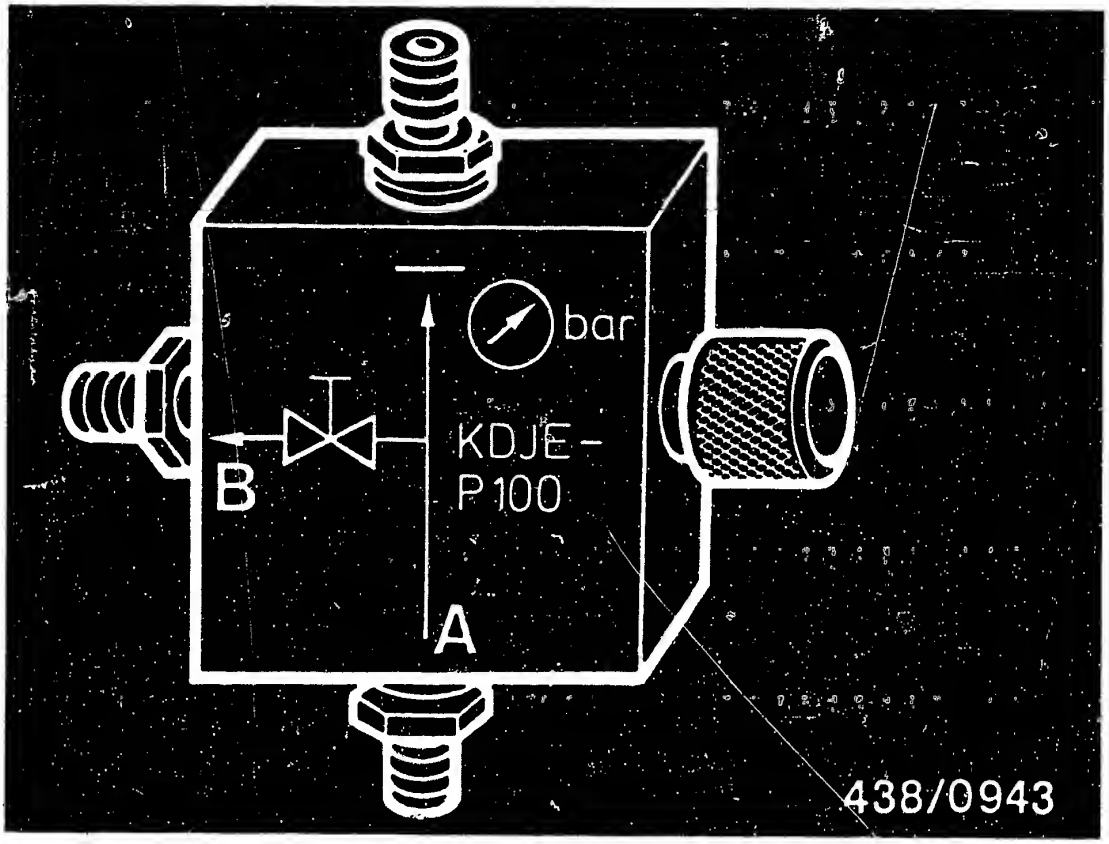
After installing the new warm-up regulator, make sure that the vacuum line (throttle-valve assembly - warm-up regulator) is in good condition and is properly connected.



15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

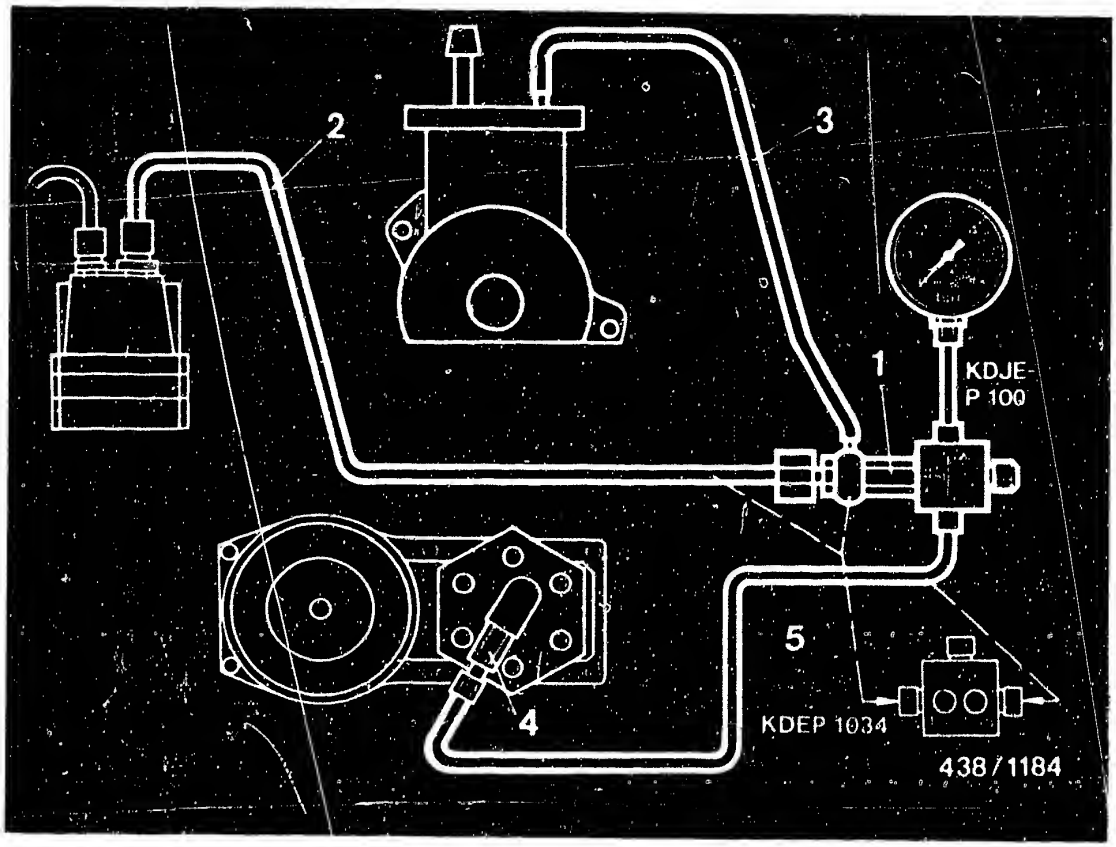
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a).



Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:

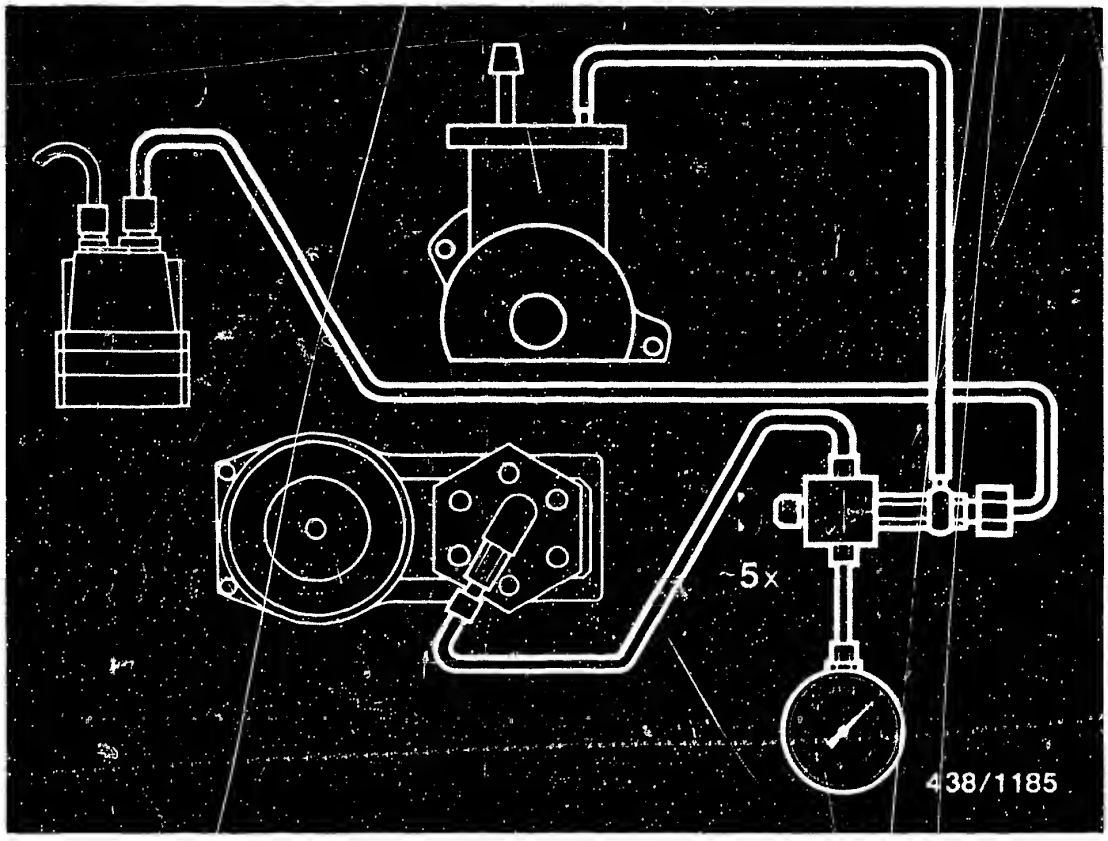
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator throttle-actuated valve)

Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



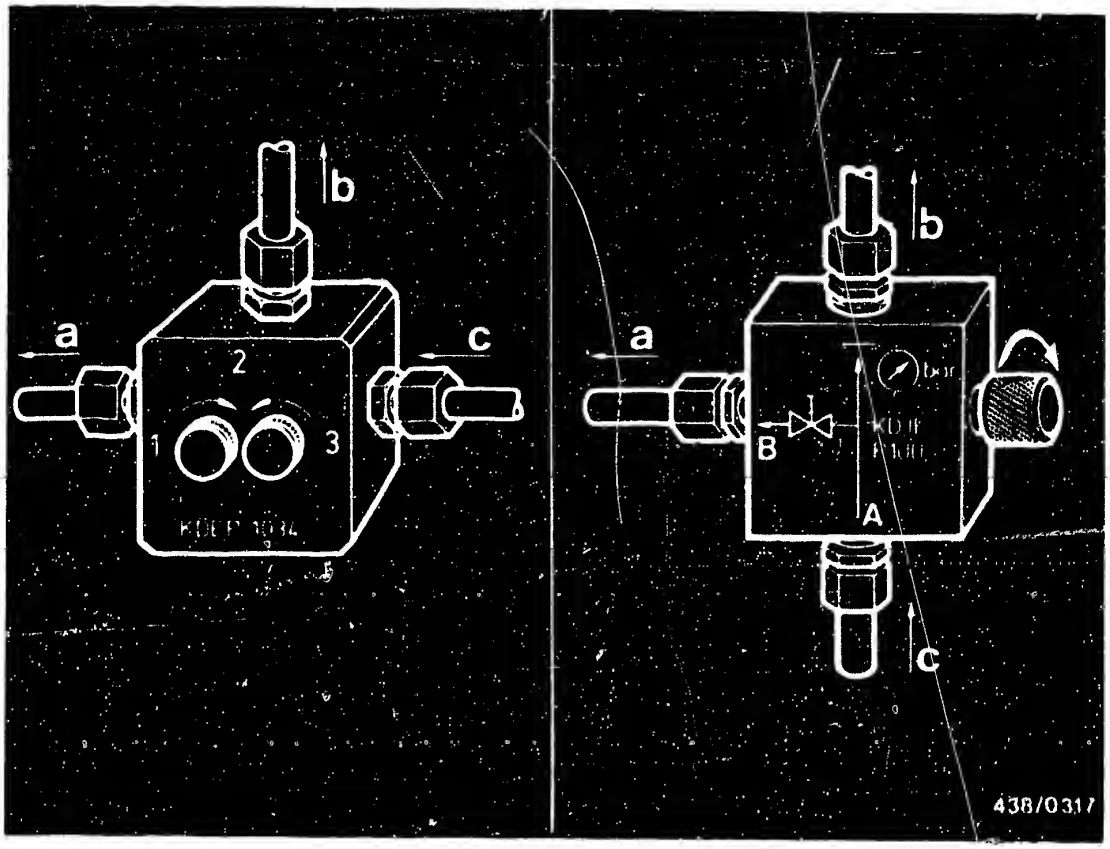
The directional-control valve is connected into the control-pressure line(s) between fuel-distributor and warm-up regulator, and warm-up regulator and throttle-actuated valve. Mount using connecting-parts set KDJE-P 100/10.

Screw the adapter of the connecting-parts set with seal-ring (1) onto connection B or 1 of the directional-control valve. Unscrew control-pressure lines to warm-up regulator (2) and throttle-actuated valve (3) on fuel distributor and connect with the original inlet-union screw to the adapter. Screw tube fitting of connecting-parts set into control-pressure connection port of fuel distributor (4), and connect by means of hose line (5) to connection A or 3 of directional-control valve.



15.2Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on electric fuel pump by switching on the ignition.
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off. The temperature of the engine is not important.

Close the valve screw of directional-control valve KDJE-P 100. In the case of KDEP 1034, close valve screw 1, open valve screw 3.

Switch on electric fuel pump by switching on the ignition.

Fuel distributor Part No.	Test specifications - primary pressure (gauge pressure)
0 438 100 004 0 438 100 006	4,5...5,2 bar (4,6...5,3 kgf/cm²)

Possible causes for too low a primary pressure:

- Fuel supply faulty
(Delivery of electric fuel pump too low).

- Primary pressure set incorrectly.

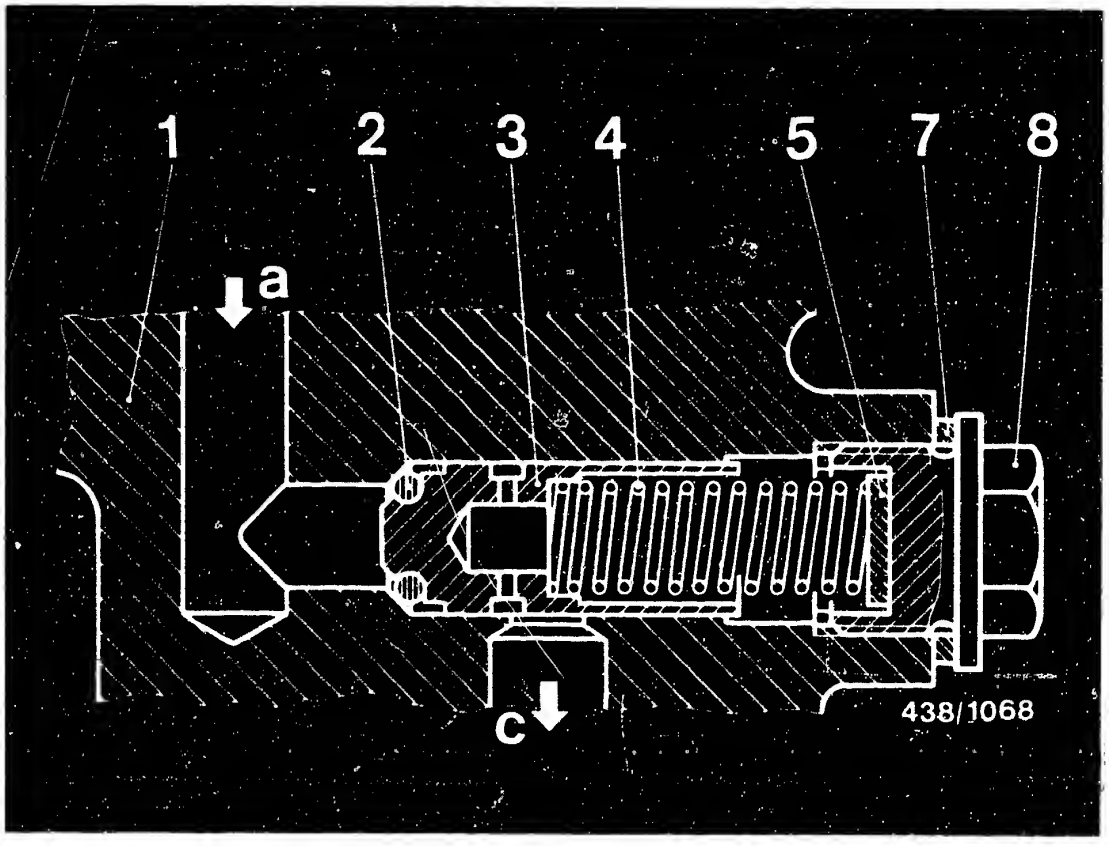
A precondition for readjustment of the primary pressure is always that the fuel supply is in order.
Measure the fuel delivery. (Test specification: 850 cm³/30 s.

Possible causes for too high a primary pressure:

- A restriction in the return line leading to the fuel tank.

- Primary-pressure regulator set incorrectly.

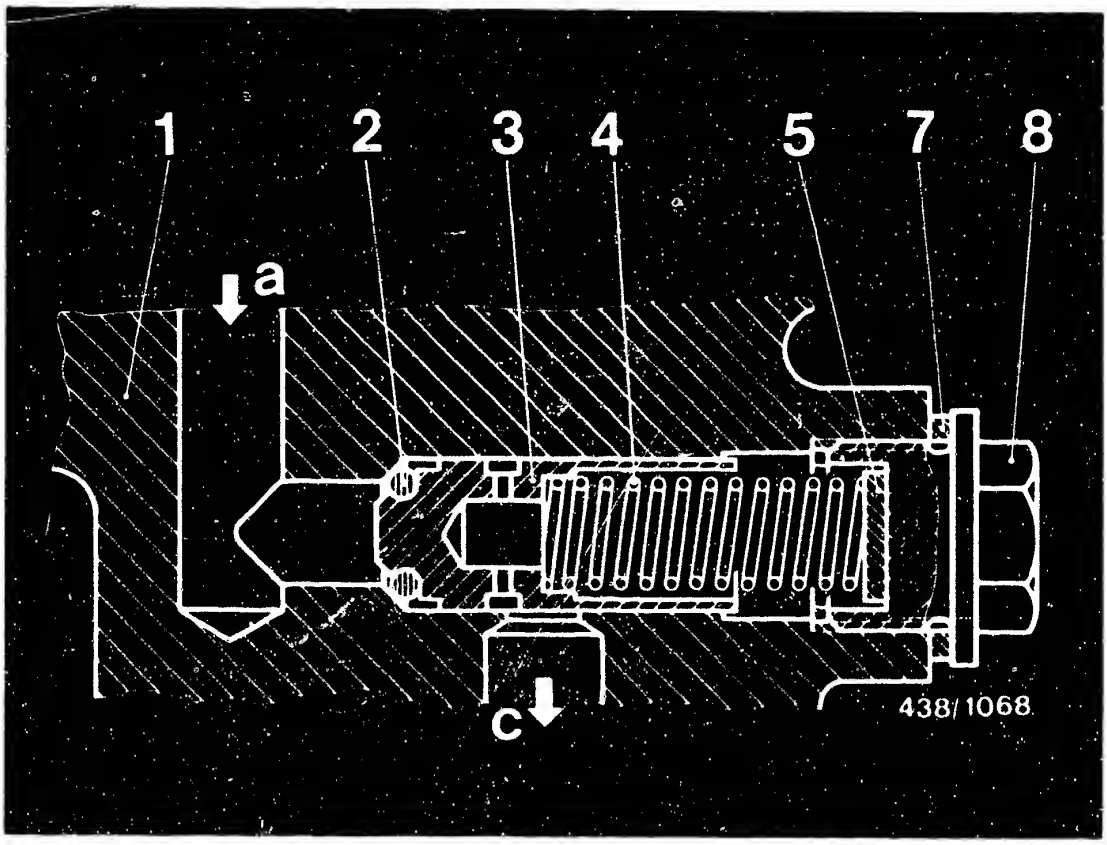
For this reason, before readjusting too high a primary pressure, always first check the condition of the return line leading to the fuel tank.



a = Primary pressure
c = Fuel return
1 = Fuel-distributor housing
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
7 = Flat seal-ring
8 = Screw plug

15.4 Adjusting the primary pressure:

Fuel distributor Part number	Setting values for primary pressure (gauge pressure)
0 438 100 004 0 438 100 006	4.7...4.9 bar (4.8...5.0 kgf/cm²)

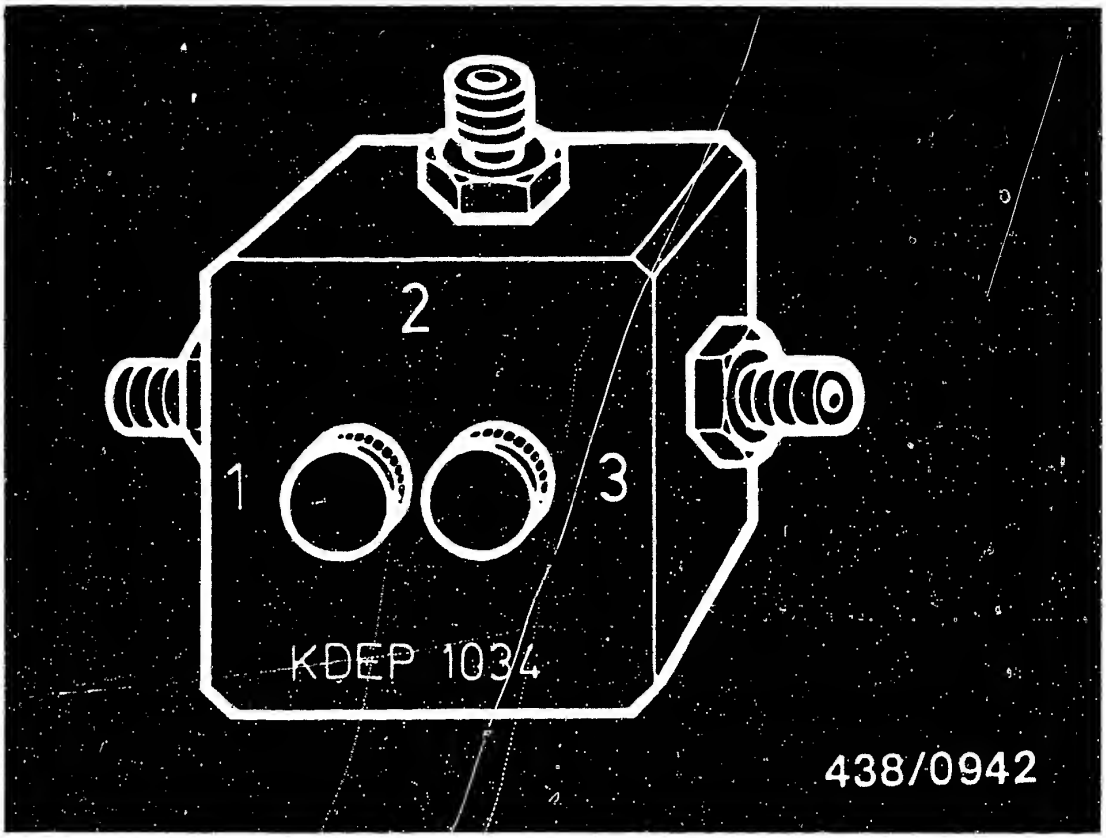


Readjust the primary pressure by changing the shims Item 5 in the primary-pressure regulator.

Note: 0.1 mm greater shim thickness means approx. 0.15 bar pressure increase and vice versa.

When mounting the screw plug, always use a new seal-ring - Item 7.

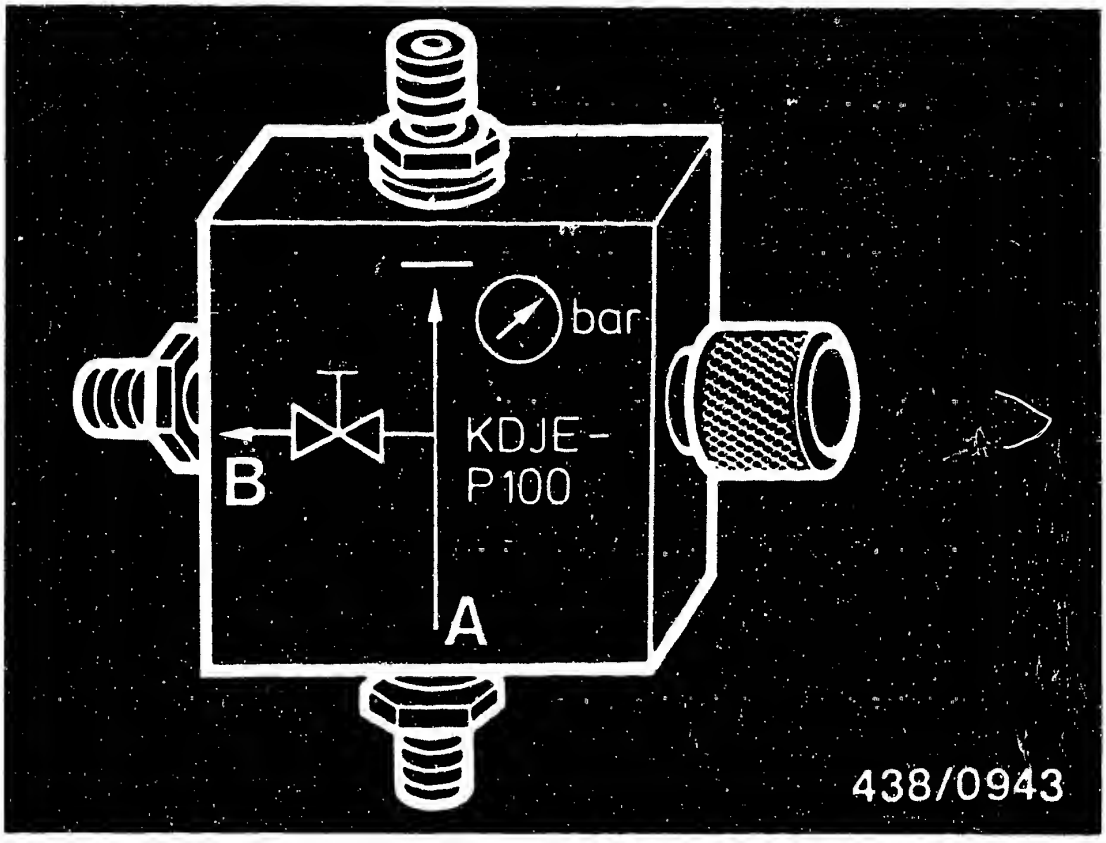
The control piston of the primary-pressure regulator must not be lost. It was matched at the factory to the fuel-distributor housing and is, therefore, the only part of the primary-pressure regulator which must not be replaced.



16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a).

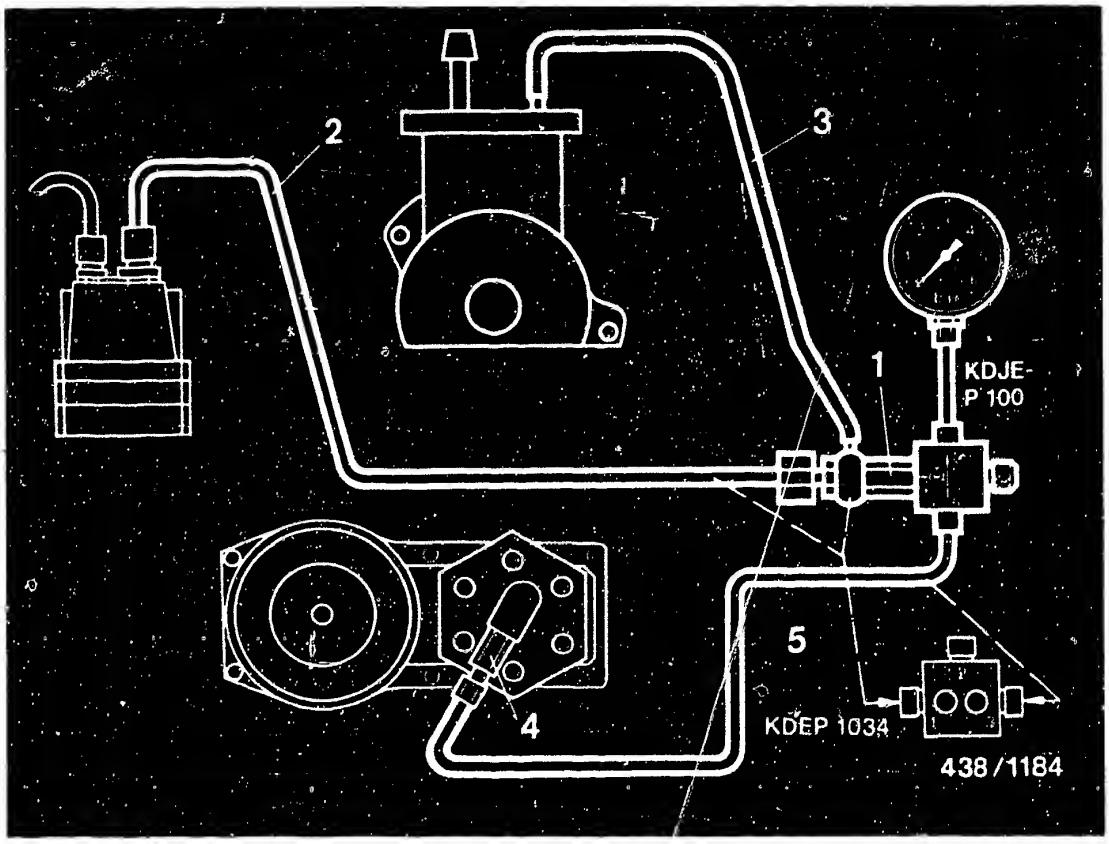


Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
throttle-actuated valve)

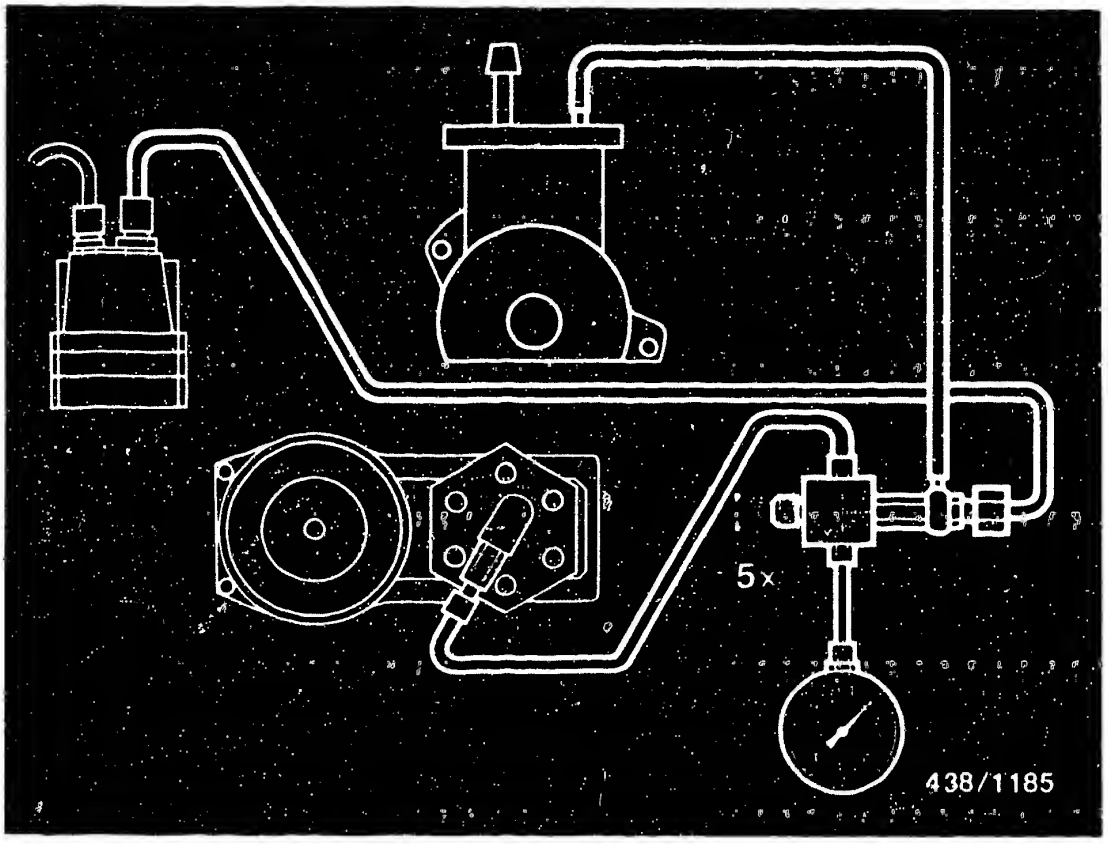
Caution:

When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



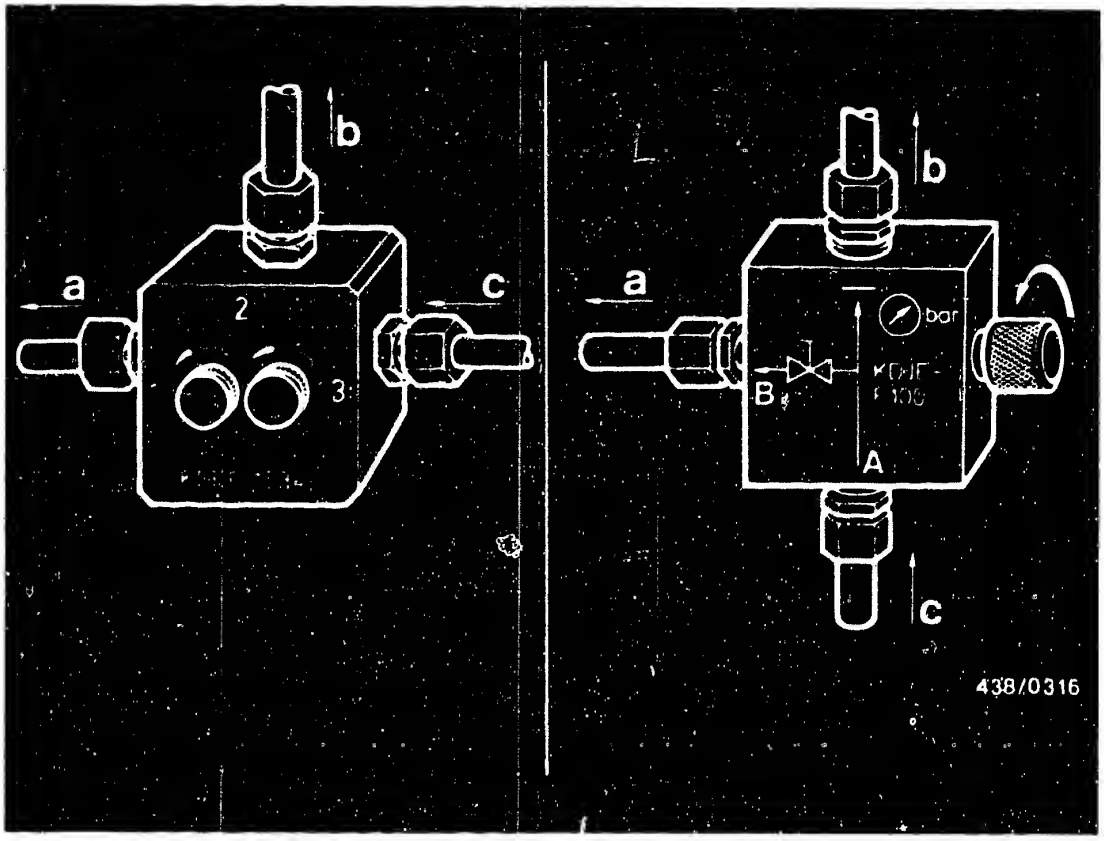
The directional-control valve is connected into the control-pressure line(s) between fuel-distributor and warm-up regulator, and warm-up regulator and throttle-actuated valve. Mount using connecting-parts set KDJE-P 100/10.

Screw the adapter of the connecting-parts set with seal-ring (1) onto connection B or 1 of the directional-control valve. Unscrew control-pressure lines to warm-up regulator (2) and throttle-actuated valve (3) on fuel distributor and connect with the original inlet-union screw to the adapter. Screw tube fitting of connecting-parts set into control-pressure connection port of fuel distributor (4), and connect by means of hose line (5) to connection A or 3 of directional-control valve.



16.2 Bleeding the pressure tester:

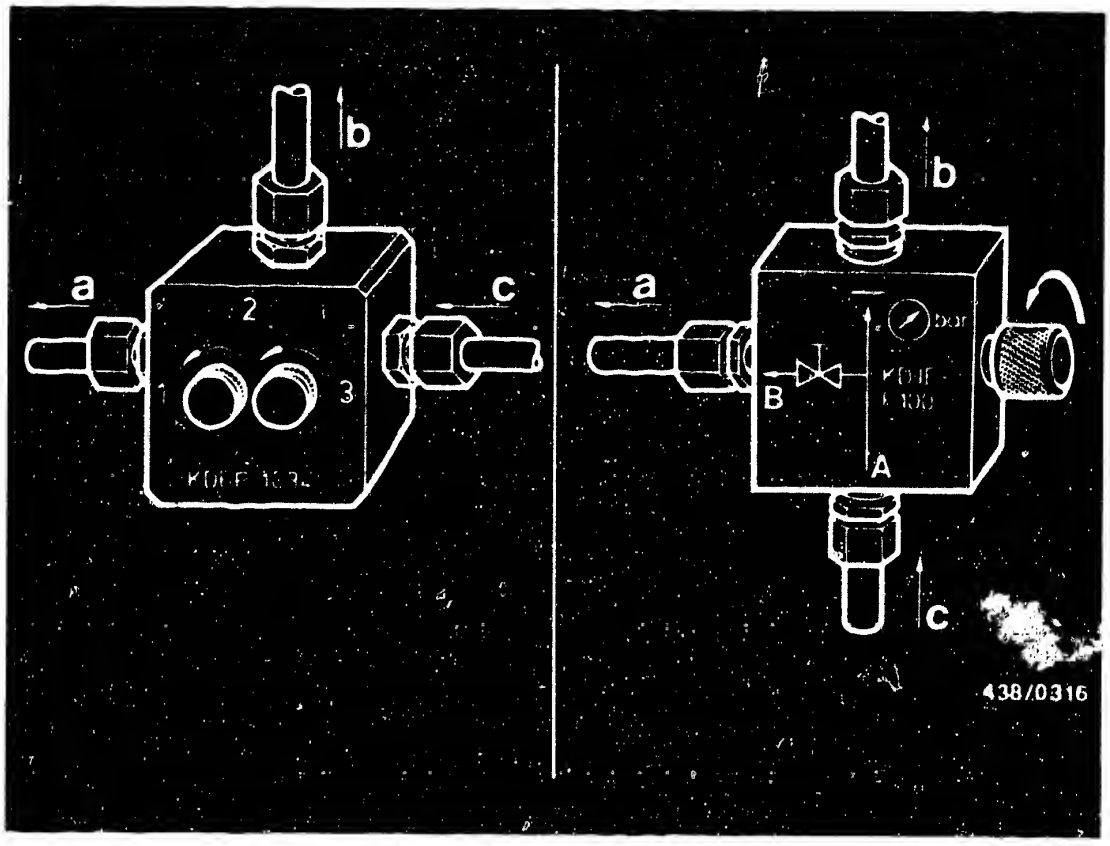
Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on electric fuel pump by switching on the ignition.
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

16.3 Leak test

The test is performed with the engine switched off. Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.
Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034).



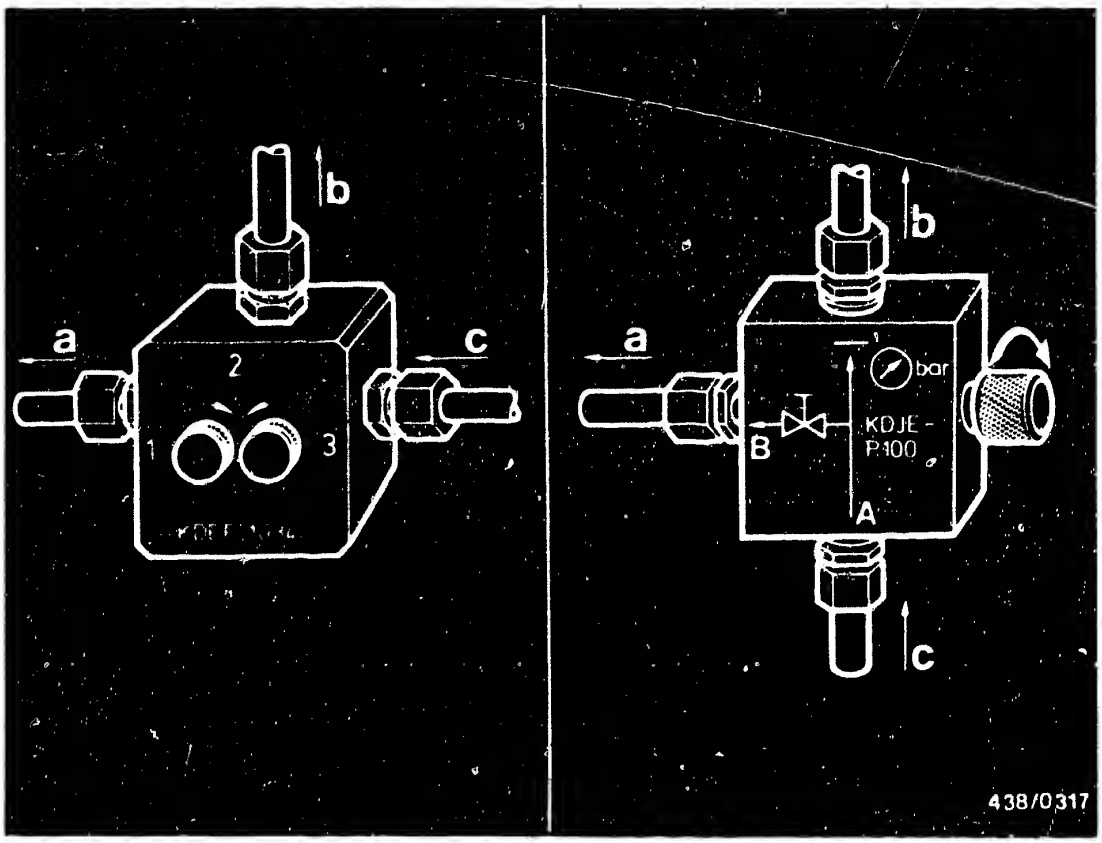
Switch on electric fuel pump by switching on the ignition.

Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).

Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.
Test specifications for leak test:

Minimum pressure after:

10 minutes: 1,3 bar (1,4 kgf/cm²) gauge pressure
20 minutes: 1,1 bar (1,2 kgf/cm²) gauge pressure

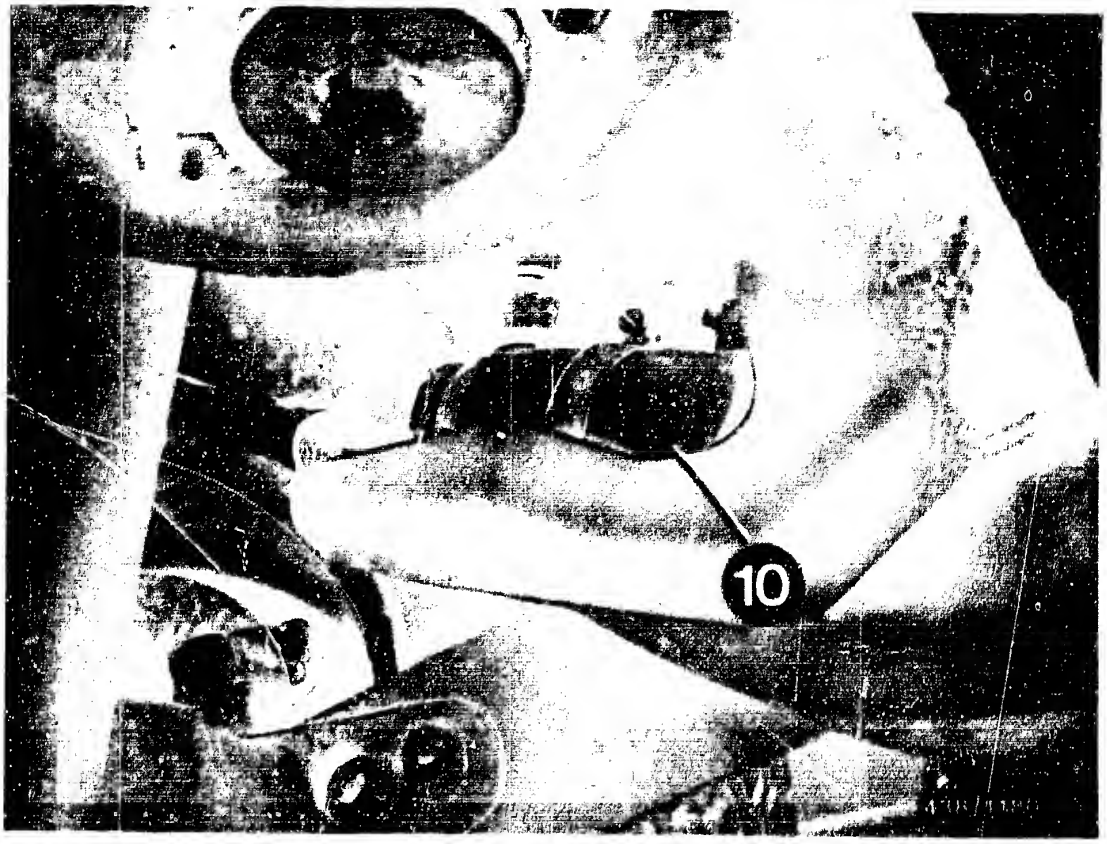


a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.

Position of the valve screws:
Close the valve screw of the directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 2.

If the same result is found, the leak is in the primary-pressure circuit.
If the test results are correct during the second test, the leak is in the control-pressure circuit.



10 = Electric fuel pump

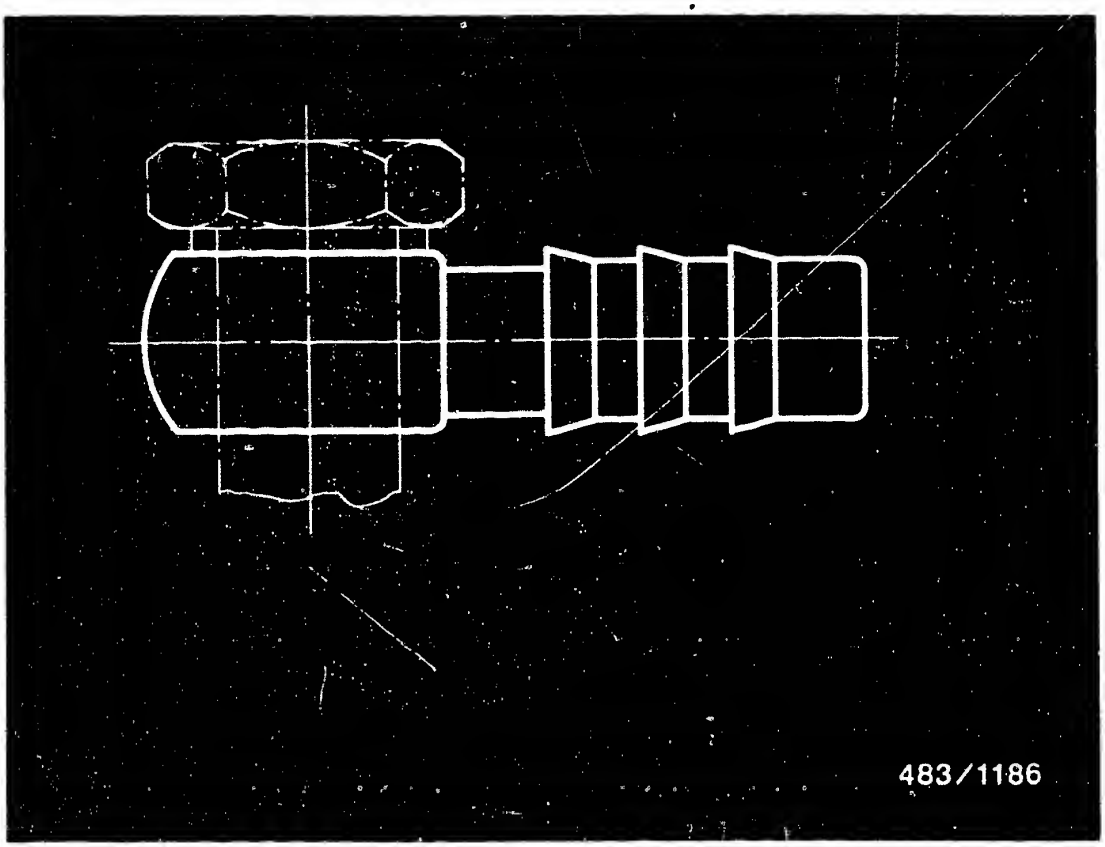
16.4 Possible causes of trouble in the primary-pressure circuit:

- Non-return valve in delivery-side inlet union of electric fuel pump leaking.

  Remove the electric fuel pump to replace the inlet union.

  Part number of inlet union with non-return valve: 1 583 385 004
  2 flat seal-rings: 1 580 203 002

  Before loosening the connections, clean them thoroughly and pinch off intake hose (e.g. using hose clamper W 157 from Matra Co.).



On the 73 and 74 models, pull off the delivery-side hose line from the inlet union after loosening the hose binder.

On the 75 model with polyamide line, remove pump complete with line (to fuel accumulator).

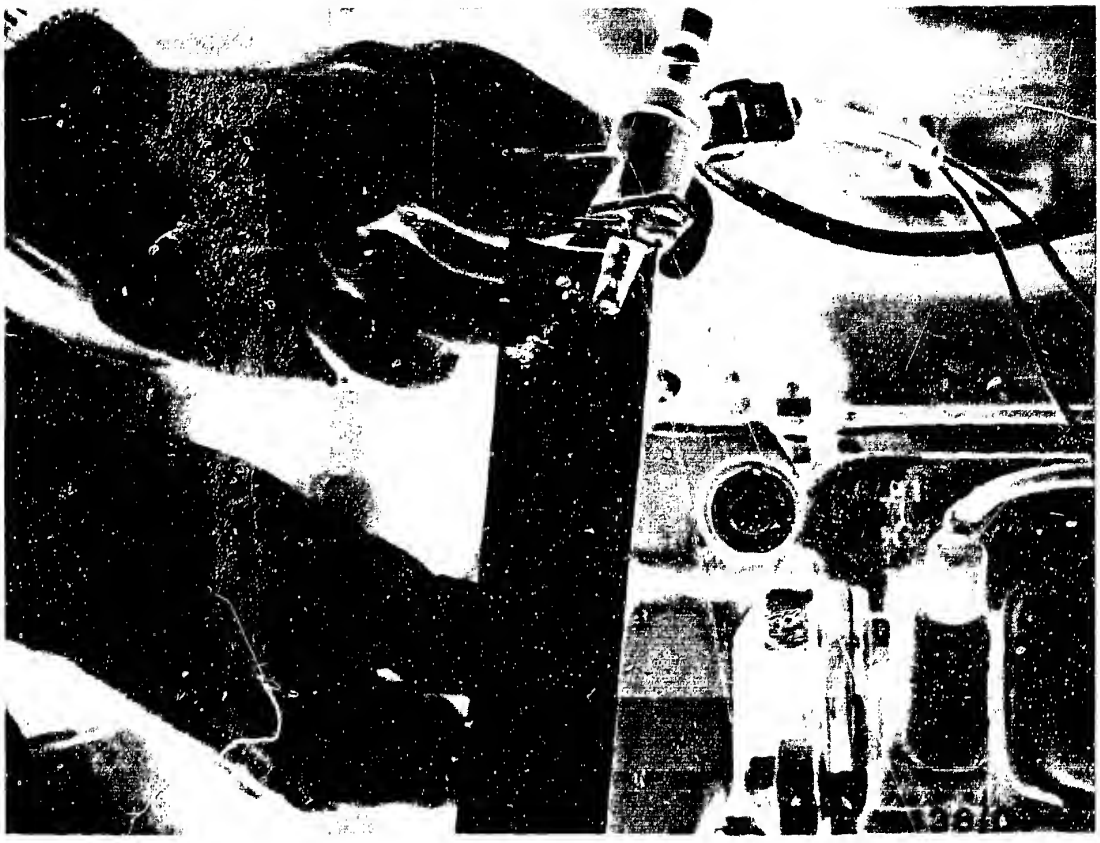
For loosening and tightening the inlet-union screw, do not clamp the pump in a vice, but have someone hold it.

Using a soldering iron, cut open the polyamide line at the inlet union (do not use open flame due to fire hazard). Cut off the section of the line which has been cut open and insert the line into assembly tool KDEP 1039 so that it projects approximately by the length of the inlet union fitting. Clamp tool with line in vice and knock inlet union cold into line using rubber hammer.

Note: Do not heat the polyamide line for mounting since it will undergo permanent expansion and this may lead to leaks.

Mount inlet union with new flat seal-rings. Observe tightening torque for inlet-union screw 16...20 Nm (1.6...2.0 kgfm) precisely.

Re-install electric fuel pump. Remove hose clamper from intake line and, finally, test all connections for leaks by means of a trial run.



Further possible cause of leaks in the primary-pressure circuit:

- Start valve leaking.

  Remove the start valve for testing. The fuel line remains connected. The start valve is mounted on the back of the air-intake housing underneath the throttle-valve assembly. For removal and installation it is advisable to use a mirror so that the connections and fastening screws are visible.

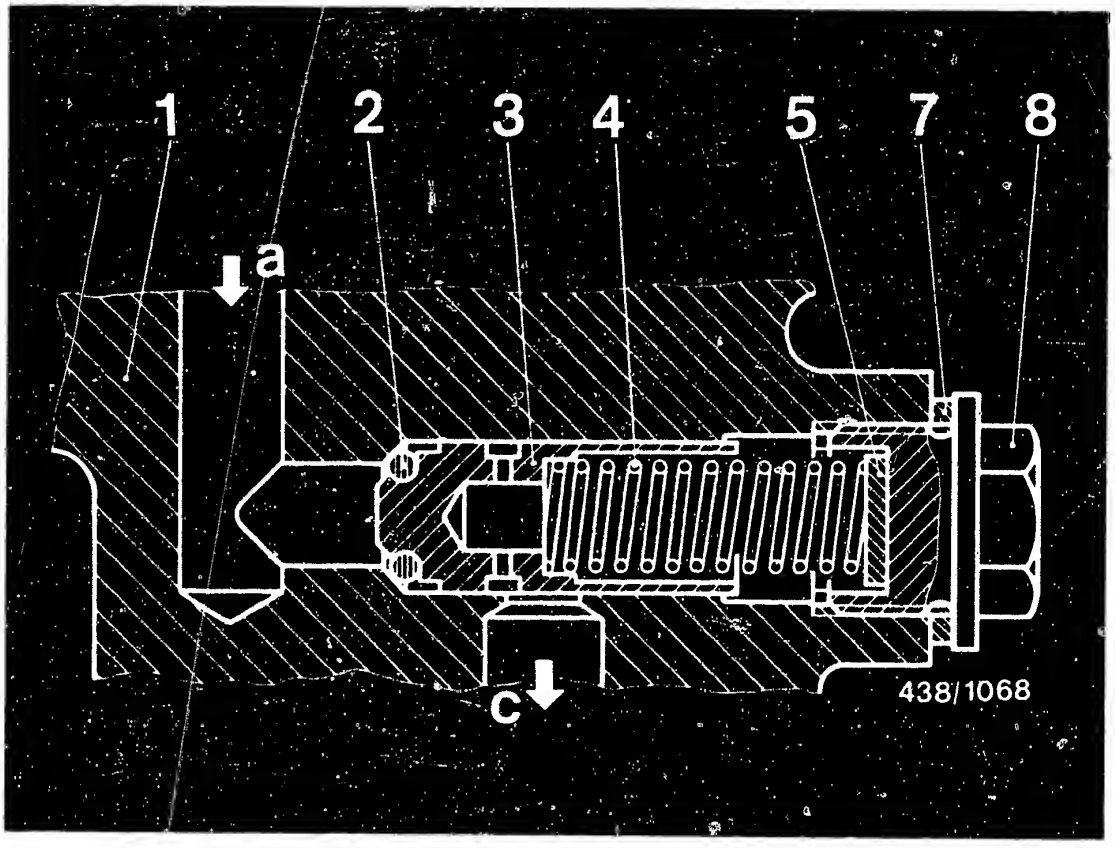
  Hold the start valve in a container, e. g. graduate. Switch on ignition so that electric fuel pump operates and so that primary pressure is applied to the start valve.

Dry off the nozzle of the cold-start valve.

No drops must fall from the nozzle of the start valve within the next minute. Even when shaken and knocked, the start valve must not leak.

Switch the electric fuel pump off again.

Replace the cold-start valve if leaky.
Finally, adjust idle speed with the engine at operating temperature.
Idle-speed adjustment is described on Coordinates H 11.



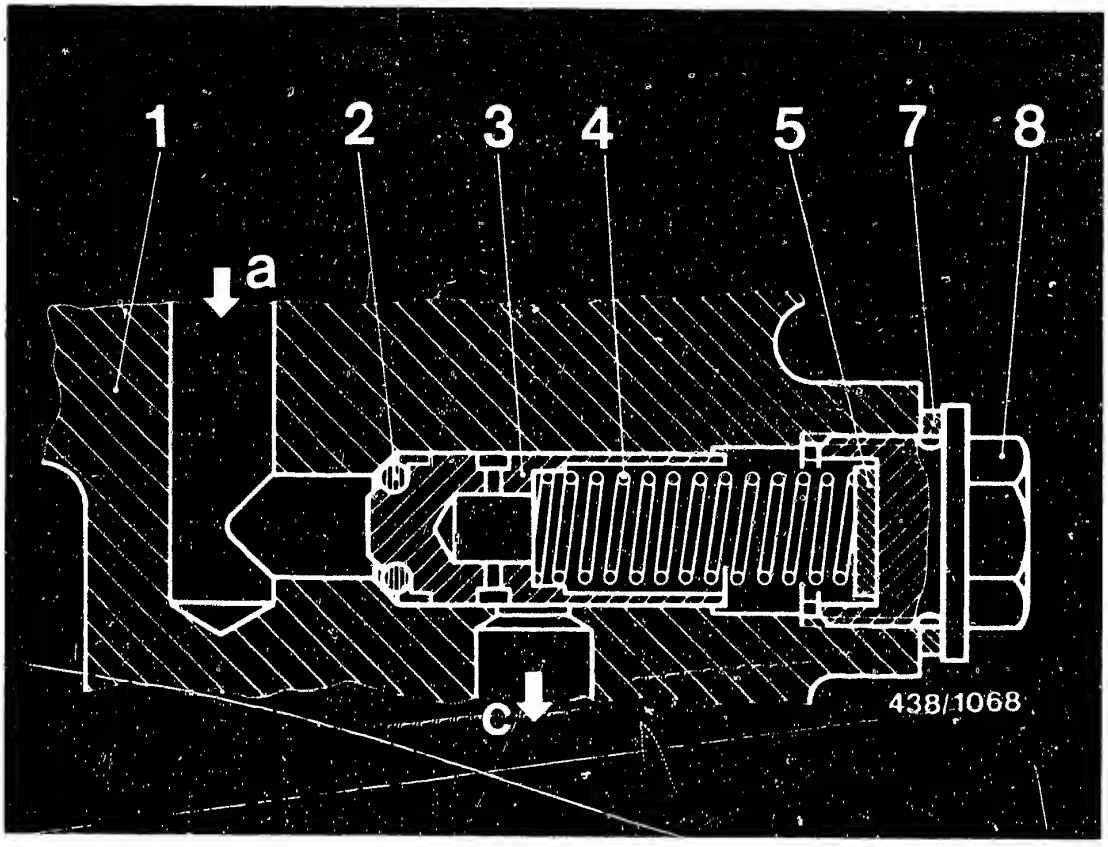
1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

Further possible cause of leaks in the primary-pressure circuit:

- Control-piston seal ring (O-ring) of the primary-pressure regulator has a leak.

Replace seal ring:
Clean fuel distributor in the region of the primary-pressure regulator.

Screw out screw plug (pay attention to shims), remove control spring and control piston.



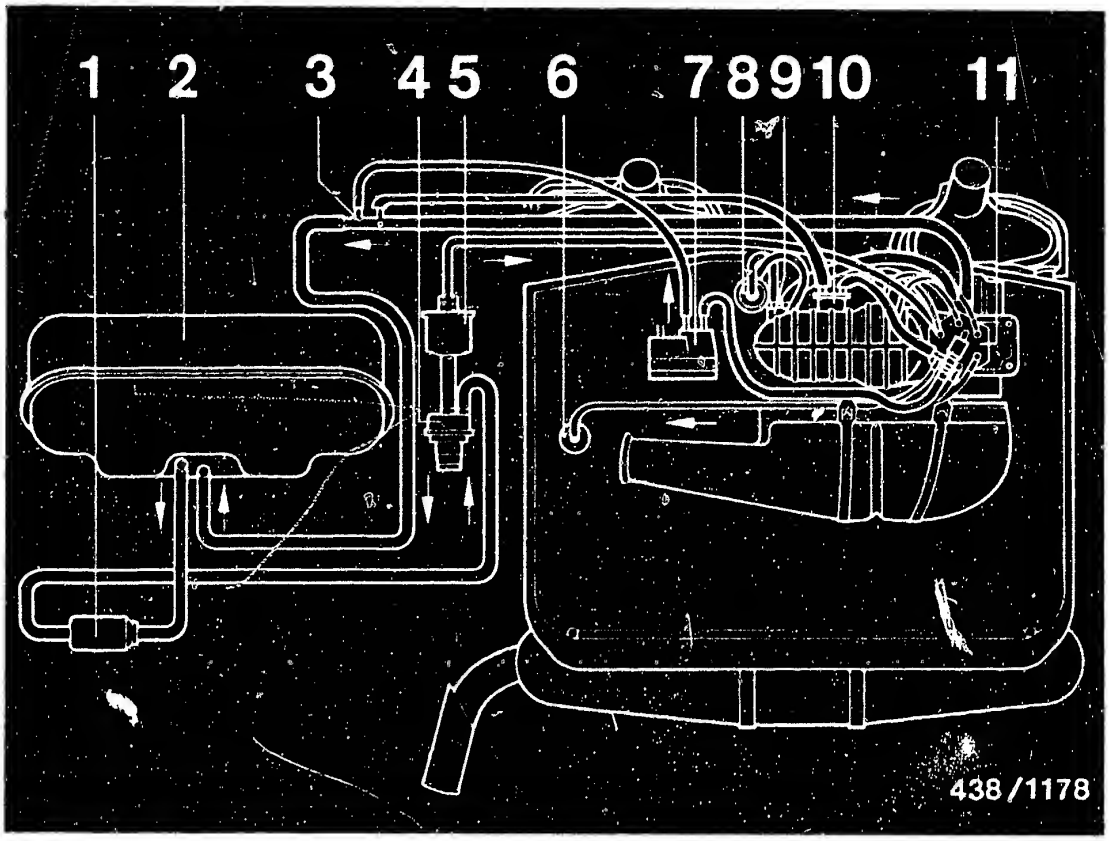
1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

Screw in screw plug (7) with shims (5) (as found when removing) and new flat seal ring (6).

Finally, check the primary pressure and, if necessary, adjust by changing the shims (5).

Primary pressure:
Fuel distributor 0 438 100 004
006

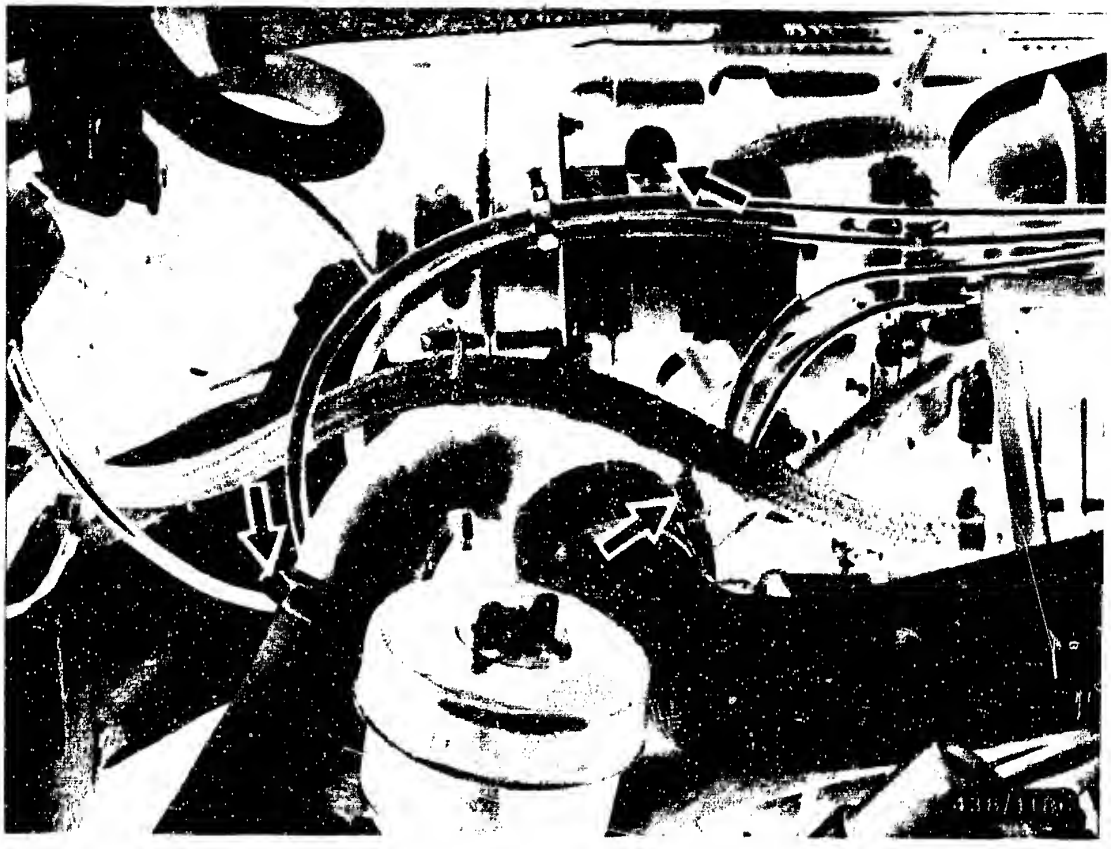
Checking value	4.5...5.2 bar	(4.6...5.3 kgf/cm²) gauge pressure
Setting value	4.7...4.9 bar	(4.8...5.0 kgf/cm²) gauge pressure



16.5 Possible cause of trouble in control-pressure circuit:

The only possible cause of a leak in the control-pressure circuit is the warm-up regulator (7) or the throttle-actuated valve (10).

For checking and locating, pinch off the respective return hose (at 3). If pinching off a return hose eliminates the leak, replace the appropriate component.



16.6 Removing and installing the warm-up regulator:

There is no problem on the 73 and 74 models.

On the 75 model with auxiliary blower, loosen the three clamping screws (identified by arrows) and disconnect the two air hoses from the distributor piece. Turn the blower motor upward with distributor piece so that the warm-up regulator becomes accessible.

In the case of warm-up regulator 0 438 140 009 (USA model 75), after installing, make sure that the vacuum hose to the throttle-valve assembly is in good condition and that it is properly connected.

Notes for installing warm-up regulator 0 438 140 129 (replacement for .. 001 and .. 008):

Remove the old warm-up regulator complete with control-pressure line (to fuel distributor).

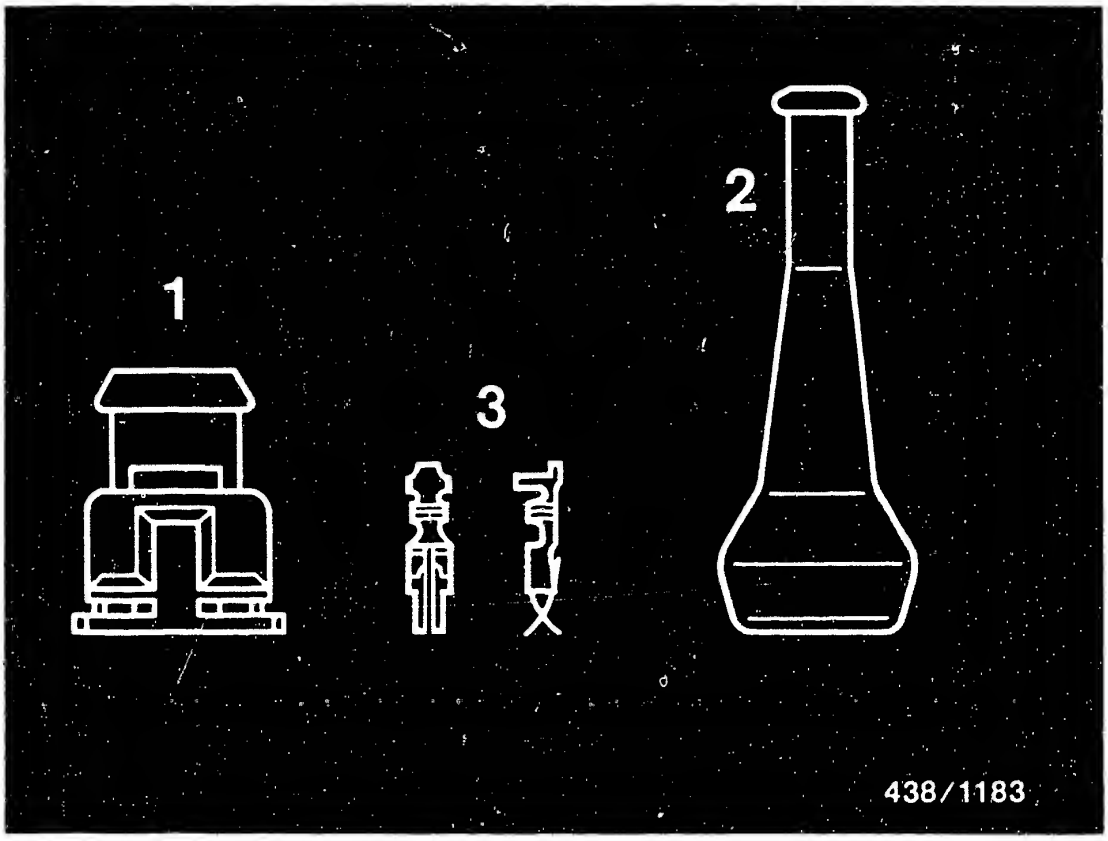
Cut off polyamide line on inlet fitting of old warm-up regulator. Insert the line into assembly tool KDEP 1039 so that it projects by the length of the fitting.

Using the assembly tool, press the polyamide line cold onto the inlet fitting of the new warm-up regulator.

Caution: Do not heat up the line for assembling since it will undergo permanent expansion and this will lead to leaks.

Re-install the warm-up regulator. Connect the inlet line to the fuel distributor and the return line to the fitting of the warm-up regulator. Securely tighten the hose binder on the return line.

Reinstall the auxiliary blower (75 model) properly.



When installing the new warm-up regulator, it is also necessary to convert the electrical connection to the now customary 2-pole version. The following are required for this:

1 = 1 plug housing assembly:	1 284 485 070
2 = 1 protective cap:	1 280 703 031
3 = 2 contacts:	1 284 477 026

The plug housing may be connected either way round since both connections of the warm-up regulator are insulated.

16.7 Removing and installing the throttle-actuated valve:

Remove the complete throttle-valve assembly from the air-intake housing so that, after unscrewing the two fastening screws, the throttle-actuated valve can be removed and remounted on the throttle shaft.

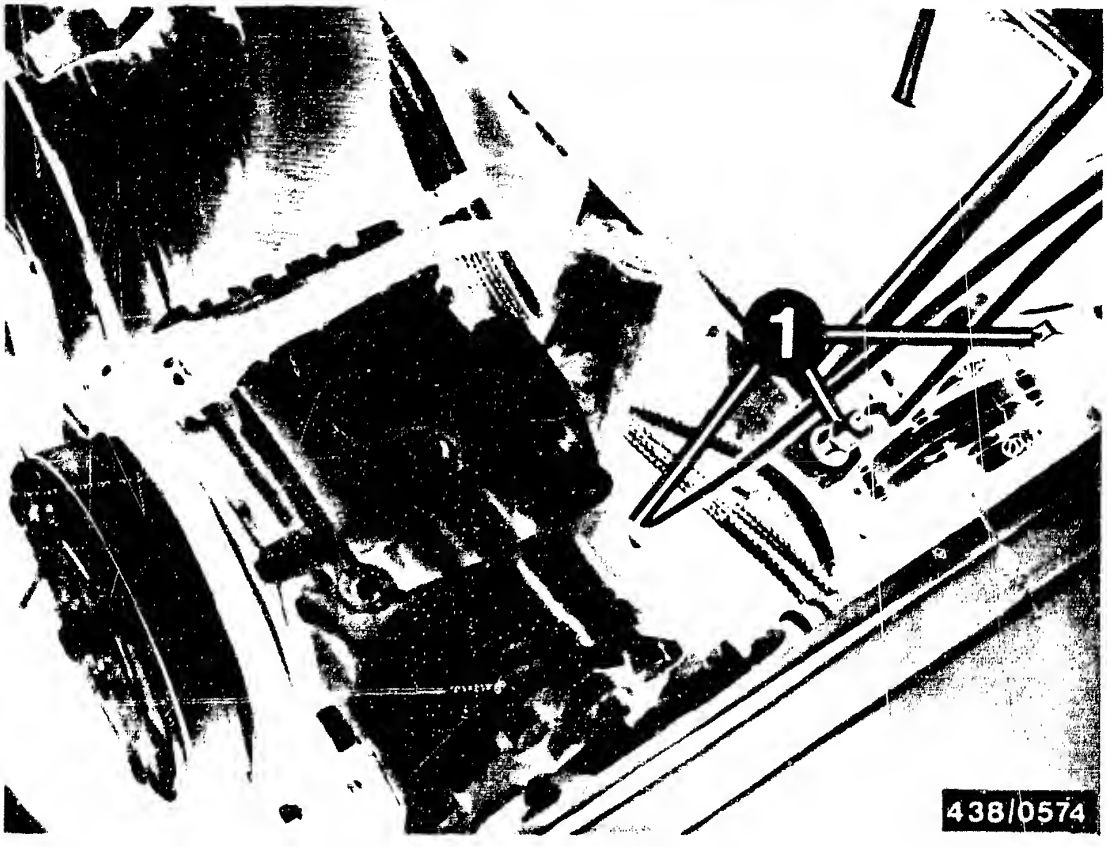
After installing the new throttle-actuated valve and the complete throttle-valve assembly, set the control-pressure idle value as follows:

The pressure tester is still connected. Open the hollow screw of the directional-control valve (both screws in the case of KDEP 1034).

Switch on the ignition so that the electric fuel pump operates. Connect the plug to the warm-up regulator and wait until the warm-up regulator has shut off.
With the throttle in the idle position, adjust the throttle-actuated valve in the area of the slots so that there is a control pressure of

2.85 ... 2.95 bar (2.95 ... 3.05 kgf/cm²) (gauge pressure).

Finally, securely tighten both fastening screws.



17. Testing the injection valves

- Remove the injection valves:

The injection valves are plugged into the flanges of the intake tubes.
Unscrew the fuel-injection lines, applying counter-force at the fixed hexagonal section of the injection valves (1). Remove the injection valves from the holding sleeves (in the intake-tube flange), and, using a small screwdriver, lift out any of the rubber cup seals which remain in the holding sleeves.
Do not damage the holding sleeve when doing this (plastic).

17.1 Test equipment and test media

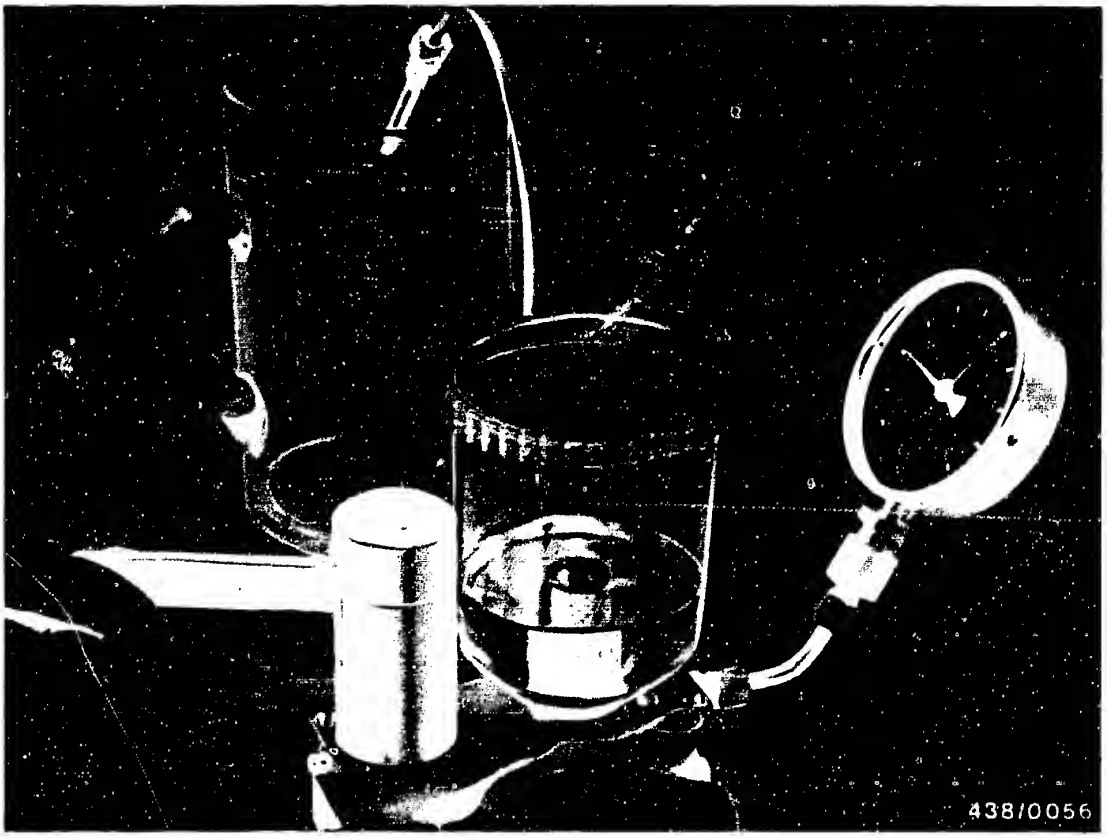
The following testing specification refers to valve testers KDJE-P 400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch, Part No. VS 14 942-CH
Former Part No. 5 973 340 650
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:

Firma
Oskar Gnamm GmbH
D-7531 Kämfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

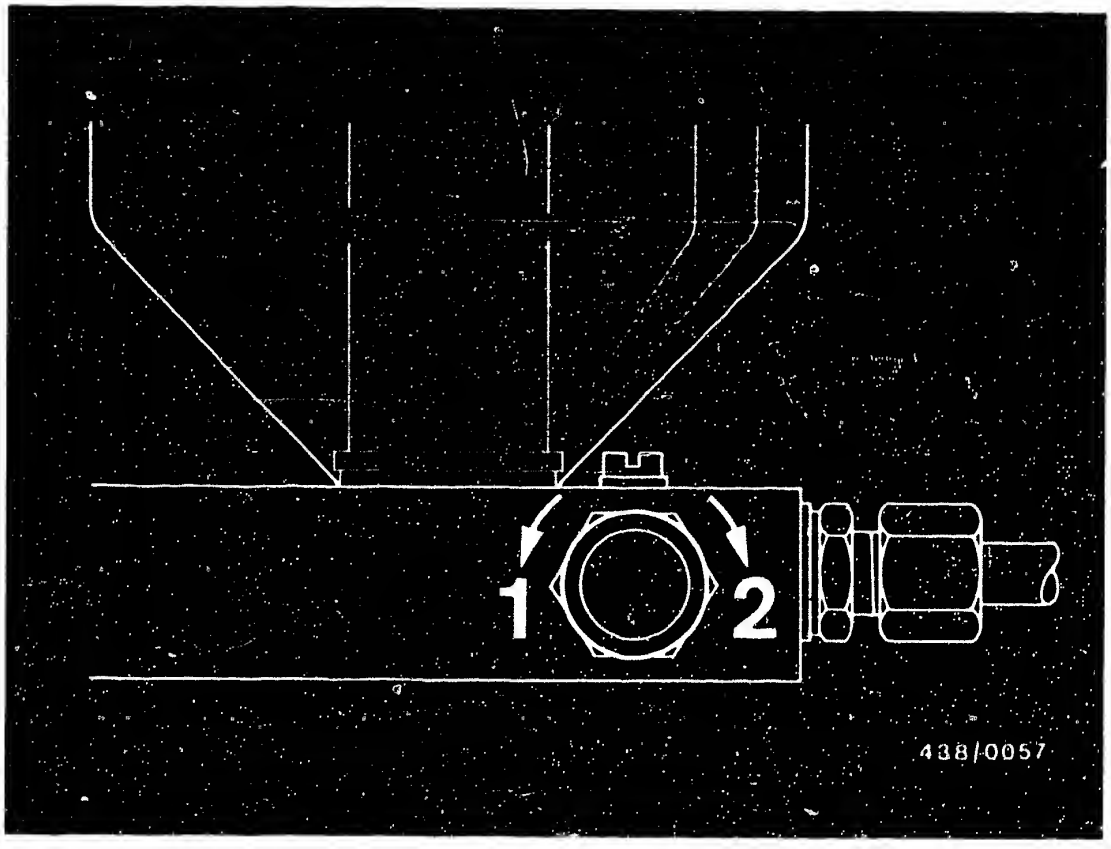


17.2 Connecting the injection valve to the tester

Connect the injection valve to the valve tester and bleed the delivery line by operating the lever several times with the union nut open. Then tighten the union nut.

17.3 Checking for dirt

Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1.5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).
You can try to flush the injection valve clear by moving the lever back and forth several times strongly.
If this attempt is successful, continue the test. If it is not possible to flush the valve clear, replace it.



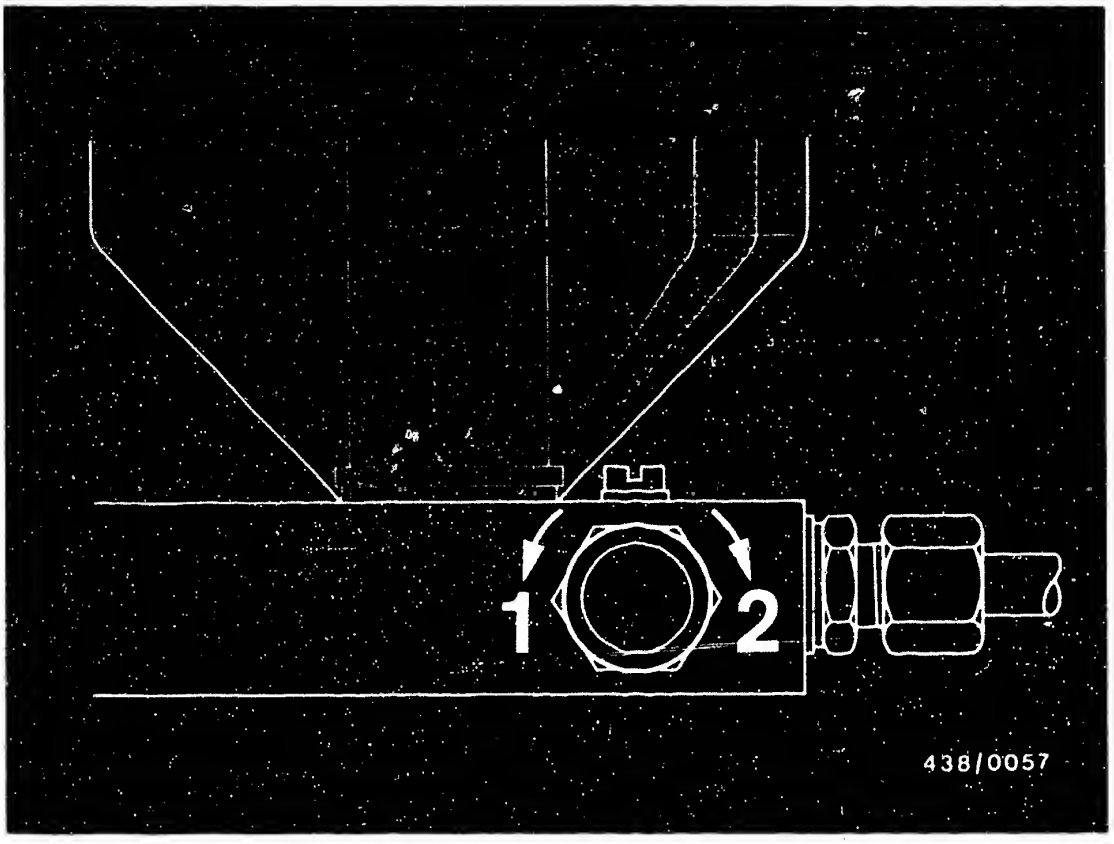
1 = Open 2 = Closed

17.4 Testing the opening pressure

Test specifications - opening pressure:

Part number:	0 437 502 004
Opening pressure:	2,5...3,6 bar (2,6...3,7 kgf/cm²)

Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

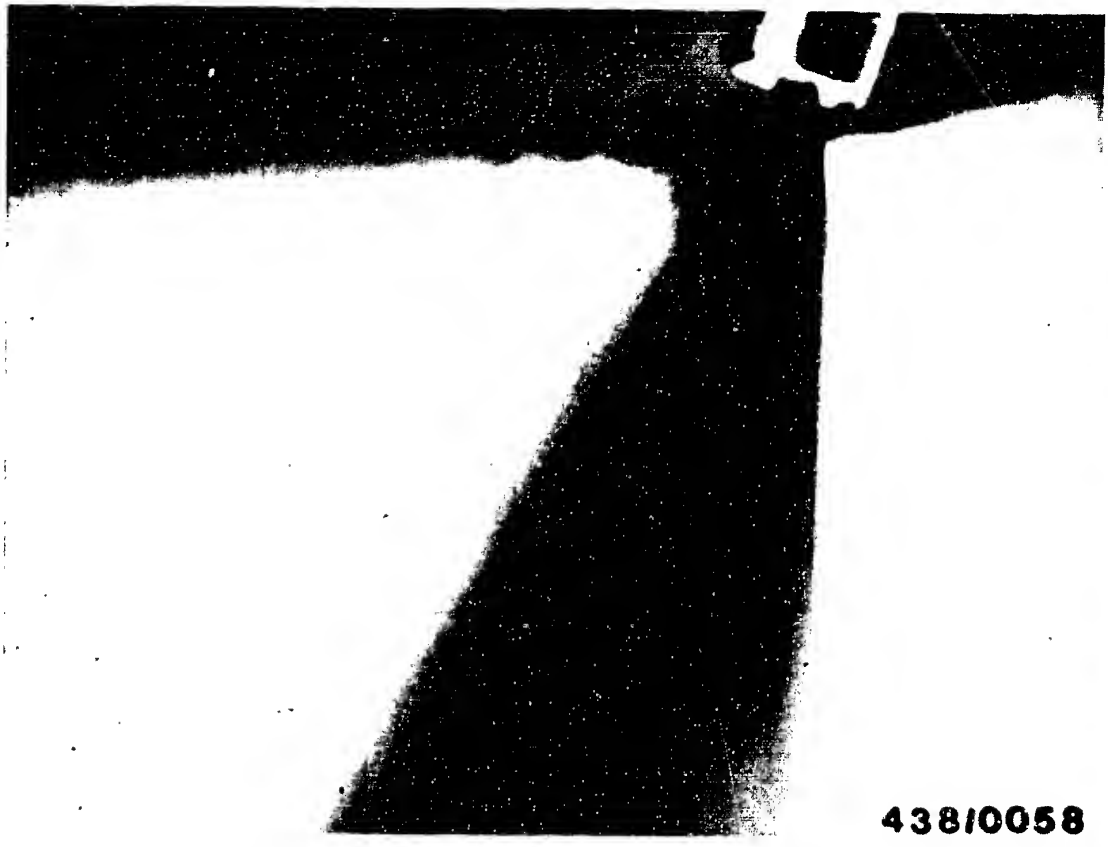


With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.
Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke).

If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.

17.5 Leakage test

Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.8 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.



438/0058

17.6 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

Illustration shows good spray formation.

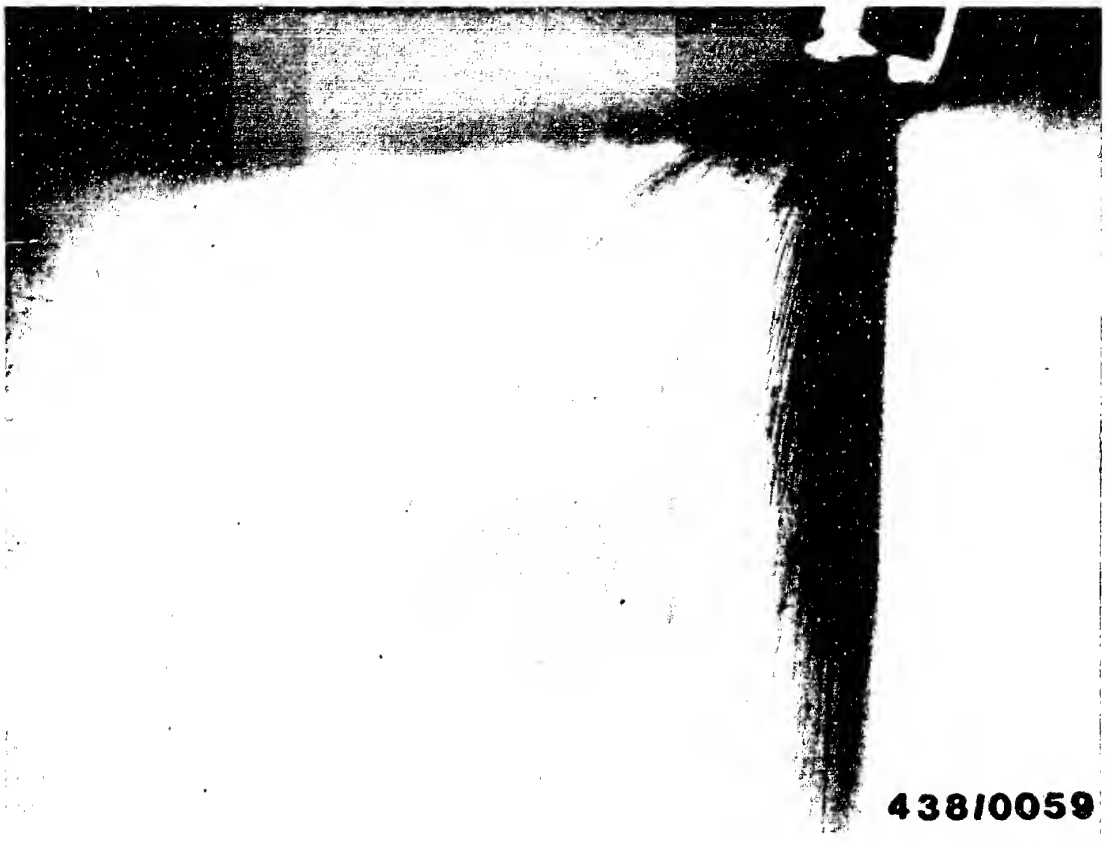
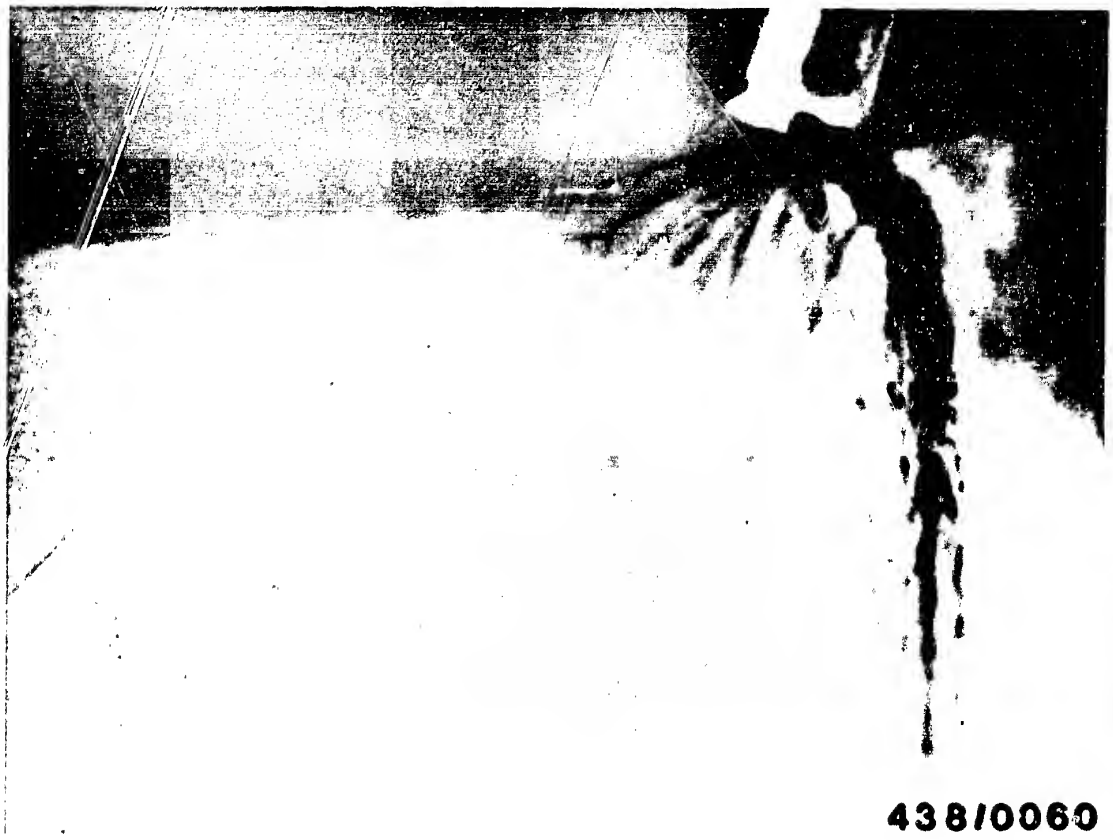


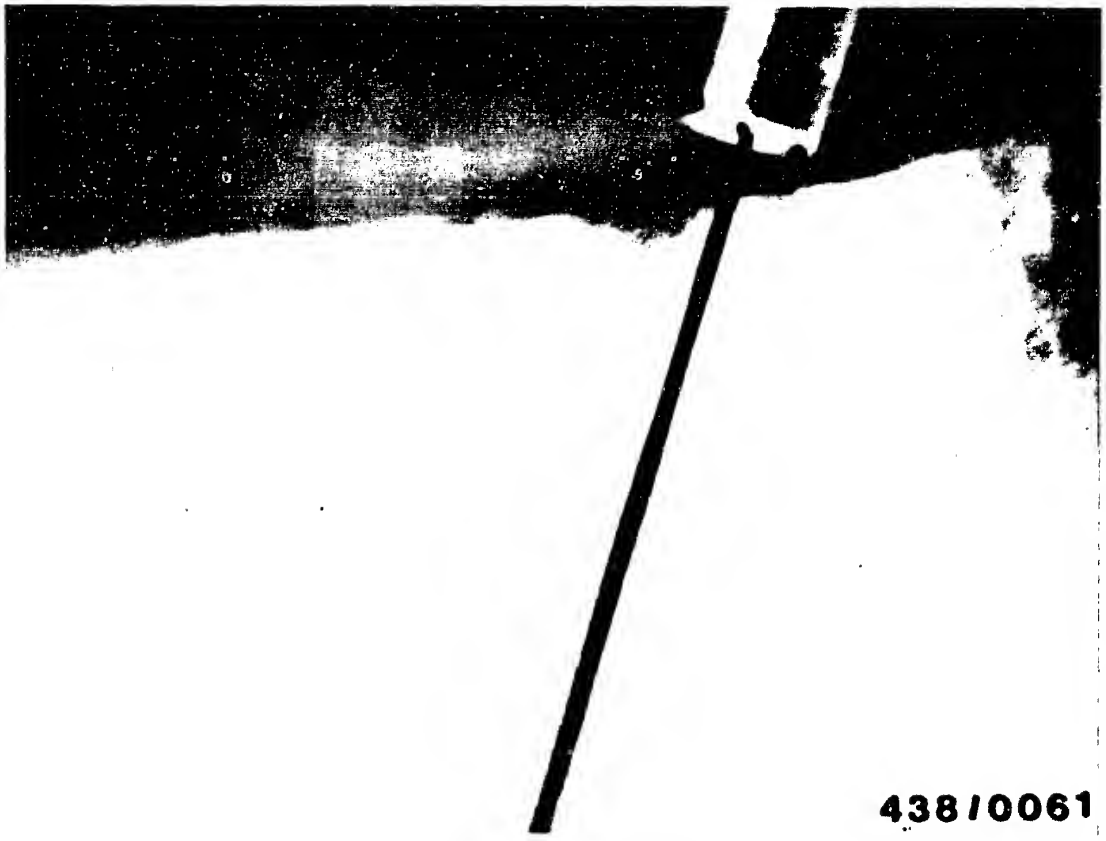
Illustration shows single-sided but nevertheless good spray formation.



438/0060

Poor spray formation; replace injection valves.

Illustration shows drop formation.



438/0061

Poor spray formation; replace injection valves.

Illustration shows "cord" spray.

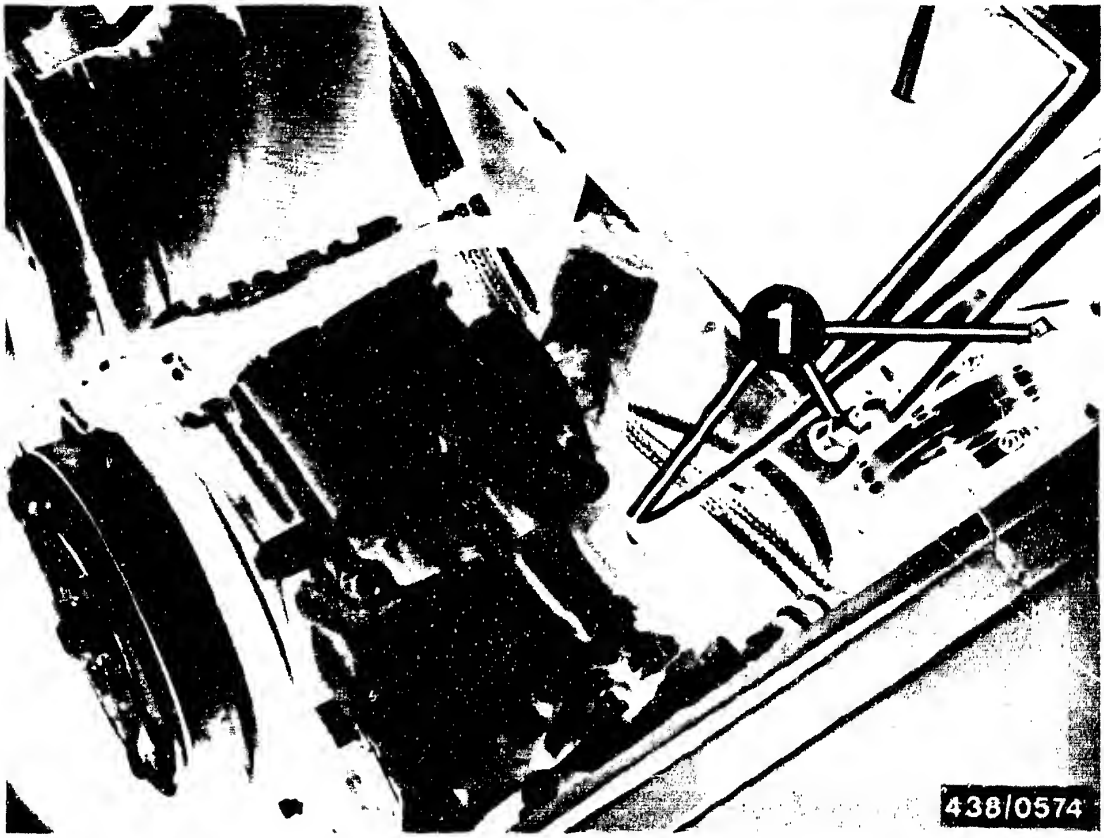
438/0062

Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 6.



17.7 Installing the injection valves:

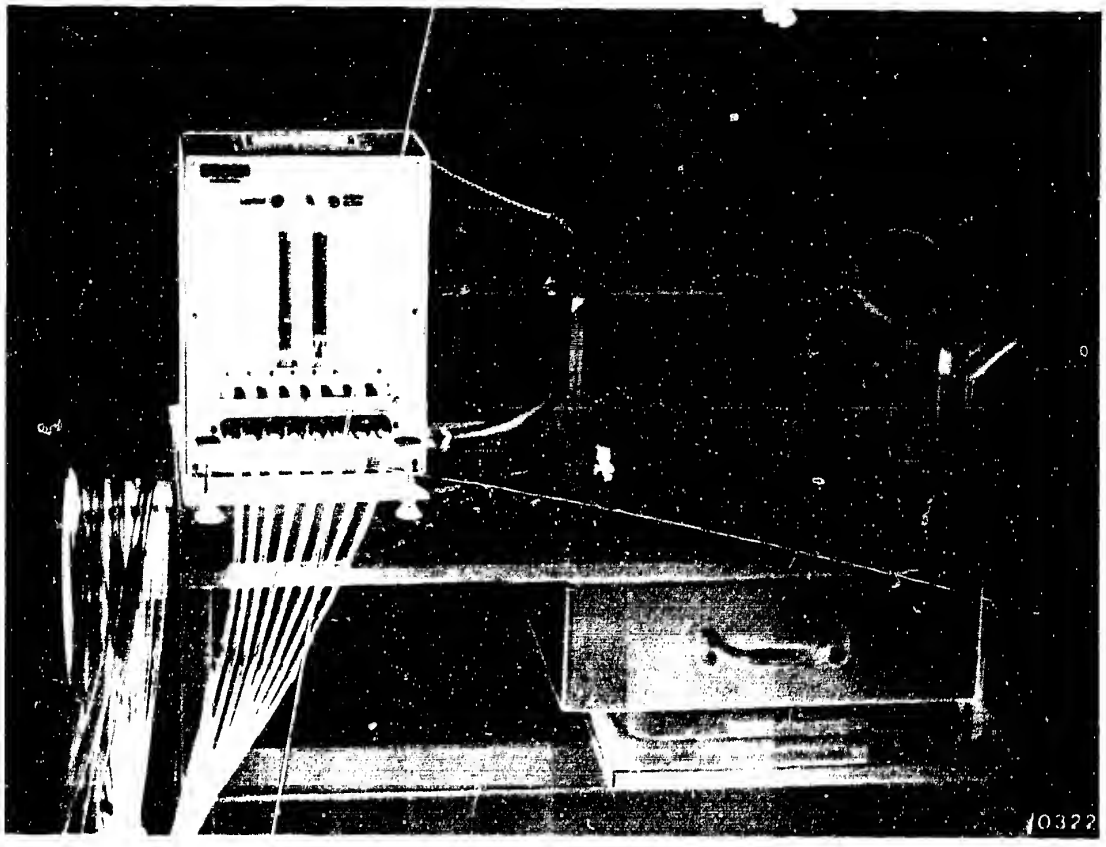
Check the rubber cup seals for damage. Replace if necessary. Wet the rubber cup seals with engine oil and fit.

Force the injection valves as far as they will go into the holding sleeves. The rubber cup seal must be underneath the bead in the holding sleeves.

Re-connect the fuel-injection lines, applying counter-force at the fixed hexagonal section of the injection valves.

If defective injection valves have been replaced, it is necessary finally to perform the idle adjustment with the engine at normal operating temperature.

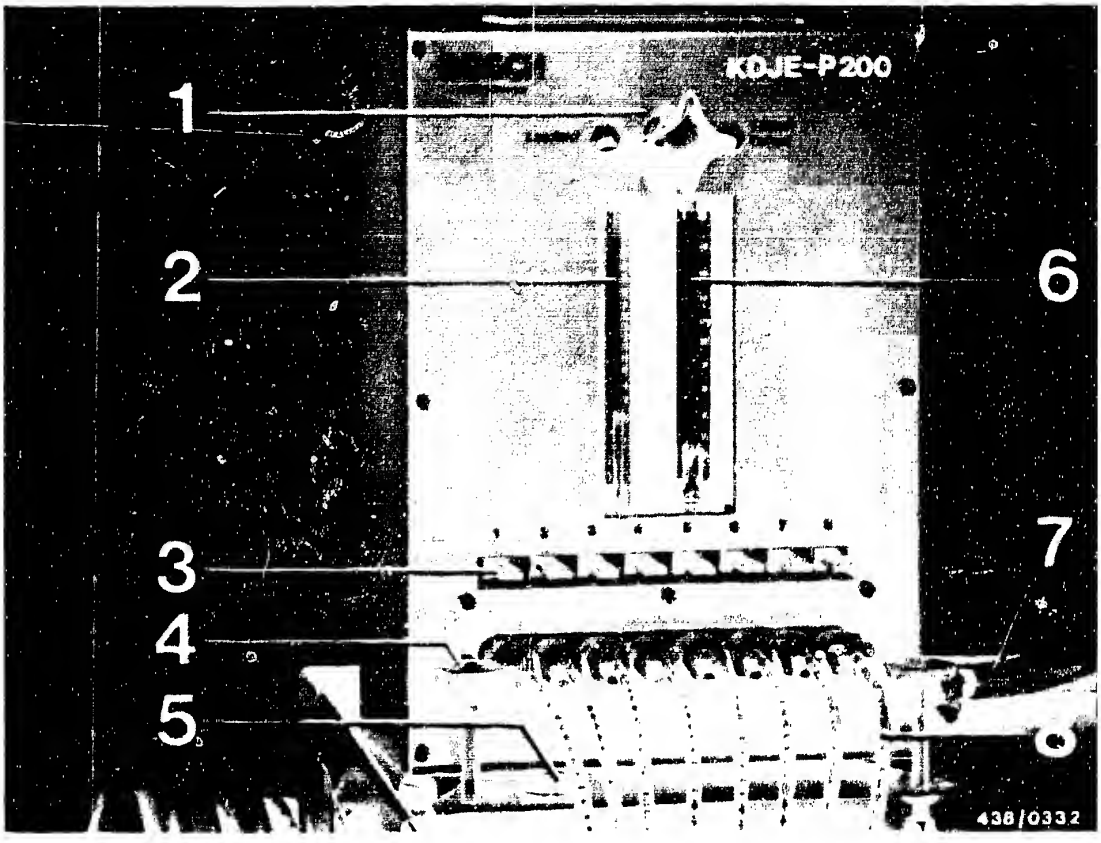
The idle adjustment is described starting on Coordinate H 11.



18. Comparative measurement of fuel delivery of fuel distributor outlets.
This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.
The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.
Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.



1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard for 8-way valve
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Return hose
8 = Polyamide hose lines (test lines)

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

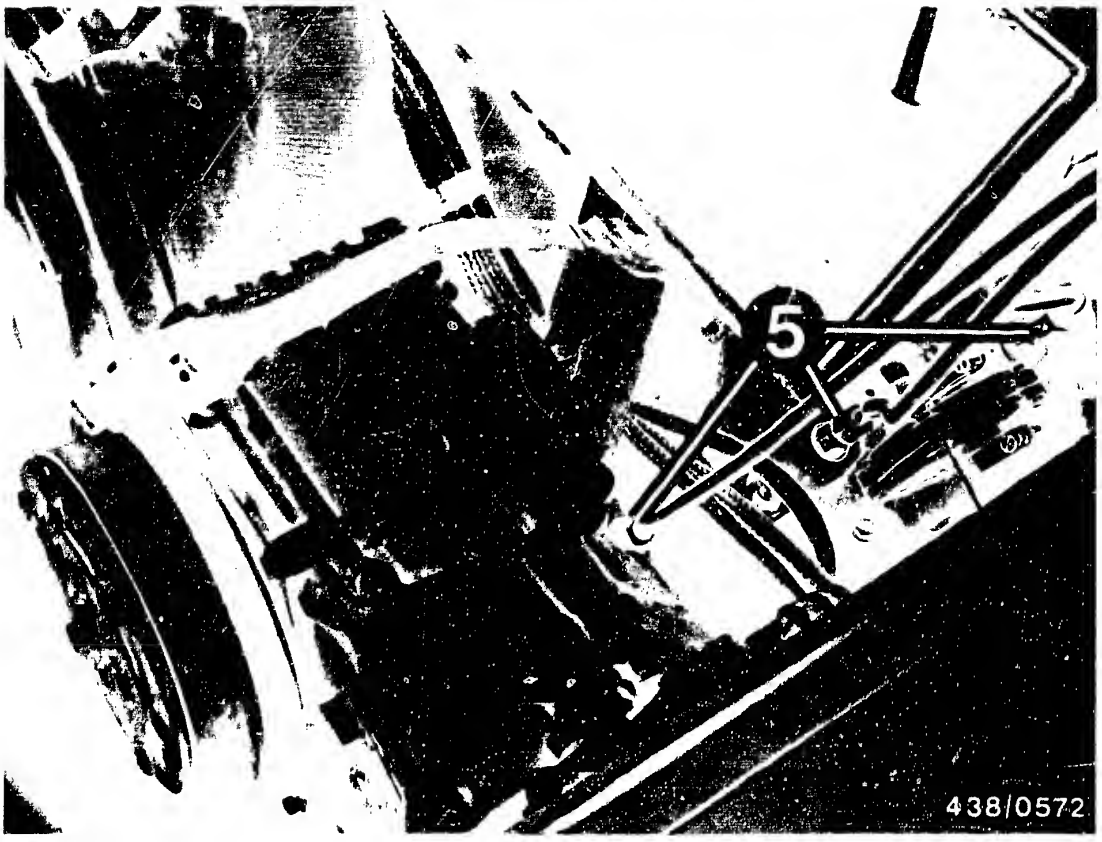
Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2...15 cm^3 and 10...180 cm^3, an 8-way valve for key operation (Item 3) and a 3-way stopcock (Item 1).

The small rotameter tube (Item 2) is used for the idle measurement while the large tube (Item 6) is used to measure the fuel delivery at part- and full-load. The particular rotameter tube to be used is connected by means of the 3-way stopcock. Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

Attached to the tester are 8 hoses (Item 8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6-cylinder systems are tested).

The fuel is returned to the fuel tank through a hose (Item 7) about 5 m long.

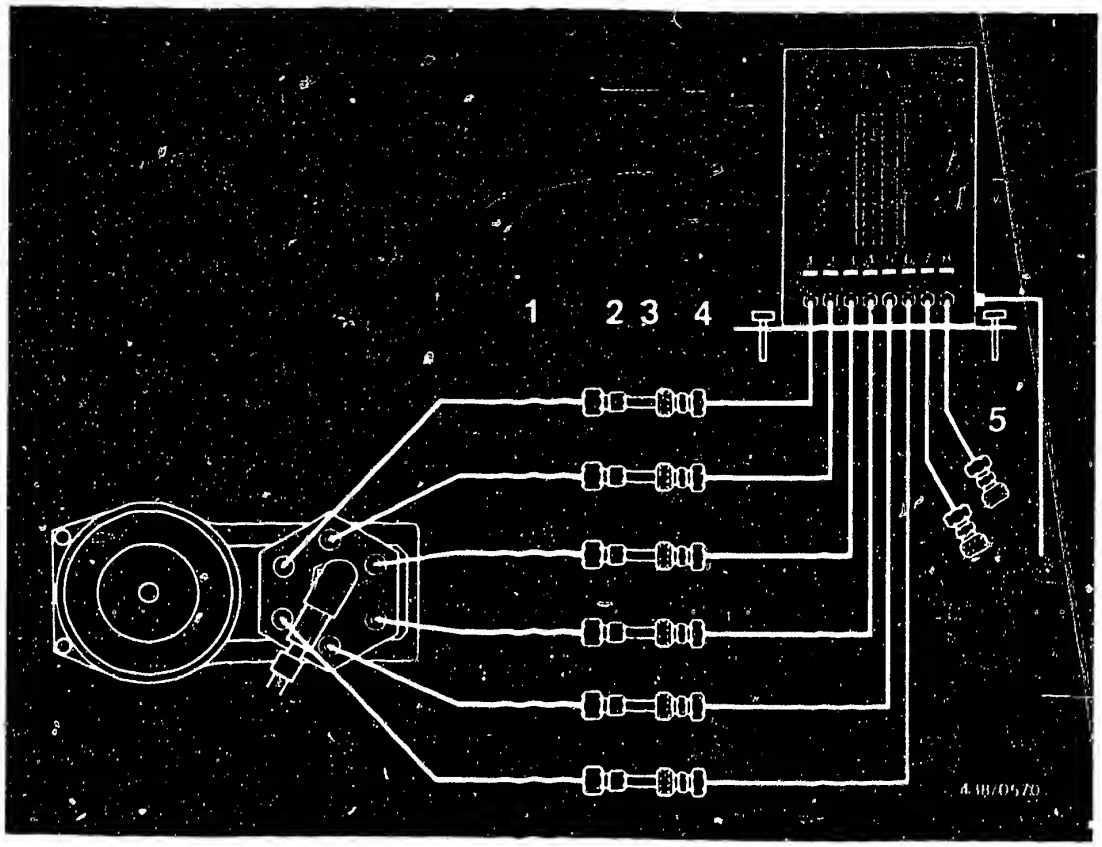
The entire test is made with a closed circuit, i.e. no fuel escapes.



18.3 Setting up and connecting the tester for delivered quantity comparison:

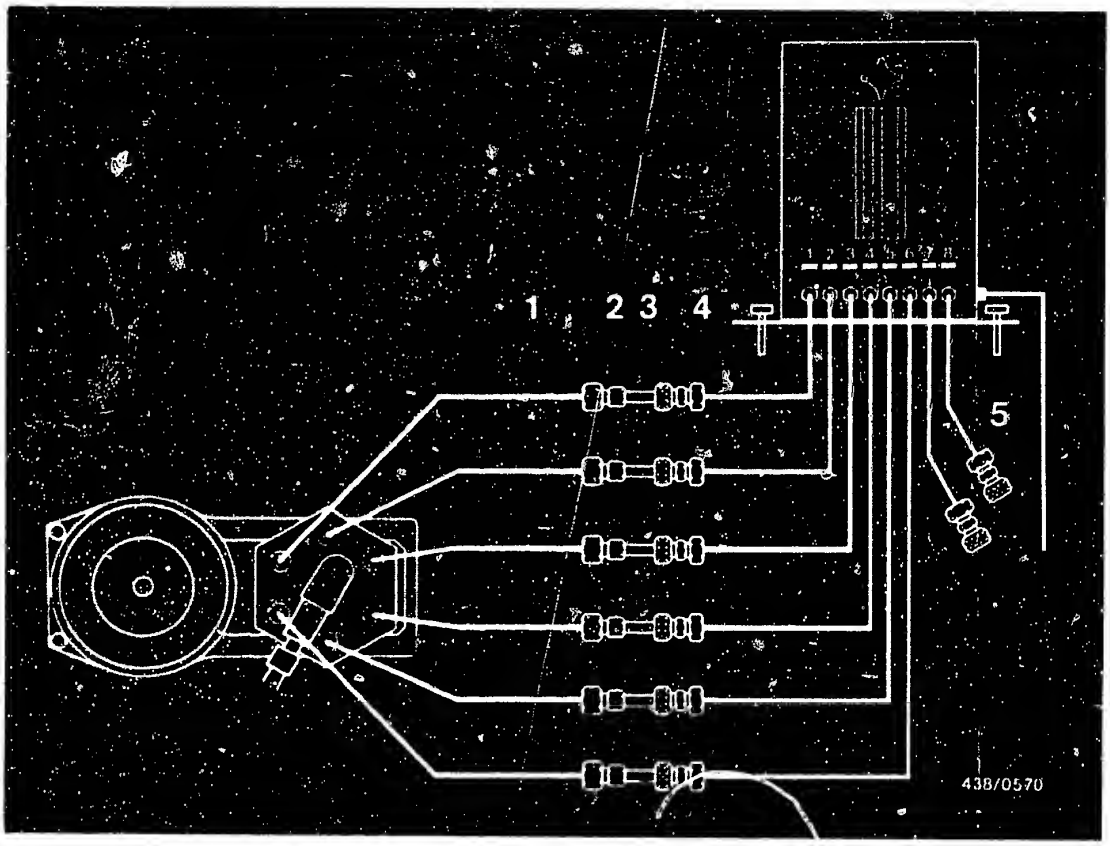
Remove the injection valves (5) for testing. The injection lines remain connected. The valves are inserted into plastic holding sleeves in the flanges of the intake tubes.

Remove injection valves from the holding sleeves, possibly using a small screwdriver to lift out rubber cup seals which remain in the holding sleeves. Do not damage the holding sleeves when doing this.



1 = Fuel-injection tubing of fuel distributor
2 = Injection valves
3 = Automatic connectors
4 = Tester hoses
5 = Return line to fuel tank filler neck

Set the tester up beside the vehicle on a solid base (e.g. on tester trolley KDJE-W 100) and align it with the built-in spirit level (water lever at base of the tester).

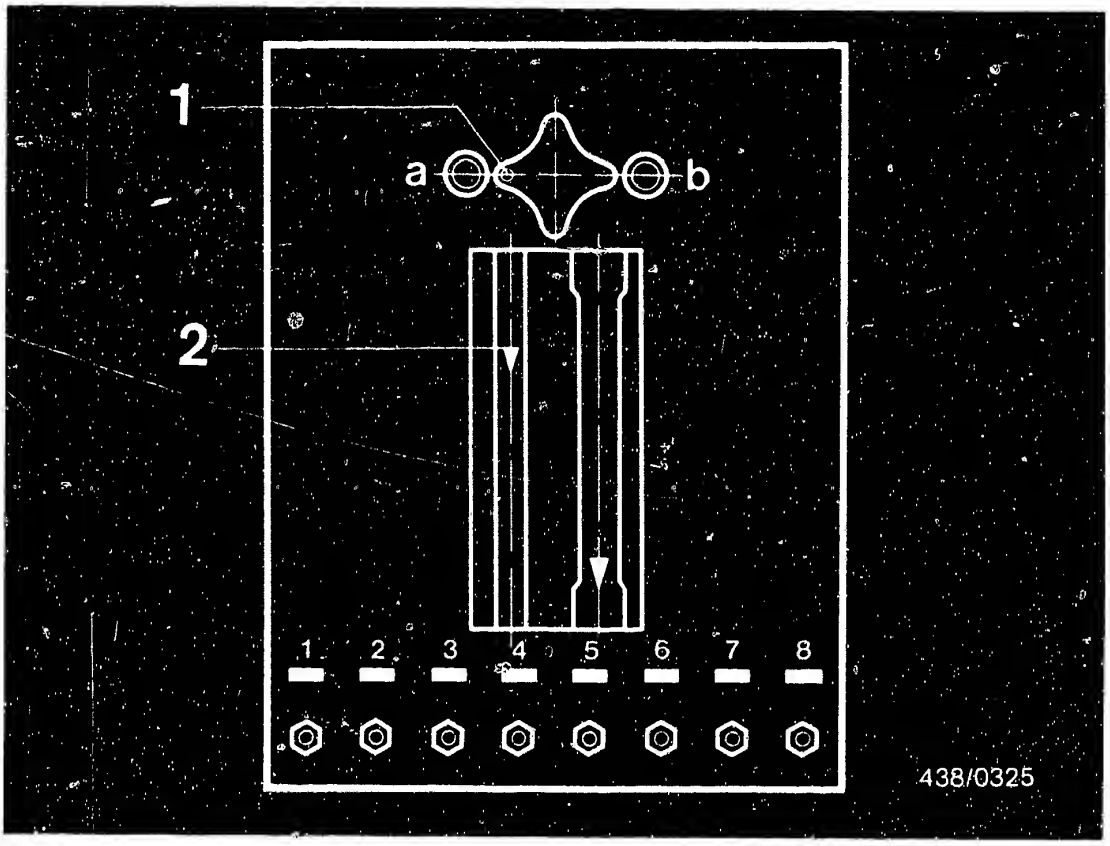


Clean the injection valves with a cloth and plug in the correct order into the automatic connectors of the first six tester hoses.

Note:
Plug in the injection valves firmly as far as they will go and tighten the knurled nuts securely so that the non-return valves of the automatic connectors are completely open. Introduce the return hose of the tester into the fuel tank filler neck.

18.4 Bleeding the tester:

Remove the rubber hood so that air-flow sensor plate becomes accessible.
Remove the electric plugs from the warm-up regulator and the auxiliary-air device.
Switch on electric fuel pump by switching on the ignition.
Raise the air-flow sensor plate to the stop.
Press the keys on the 8-way valve one after the other, while simultaneously switching the 3-way stopcock until both rotameter tubes are bled.
Return the sensor plate to the rest position.

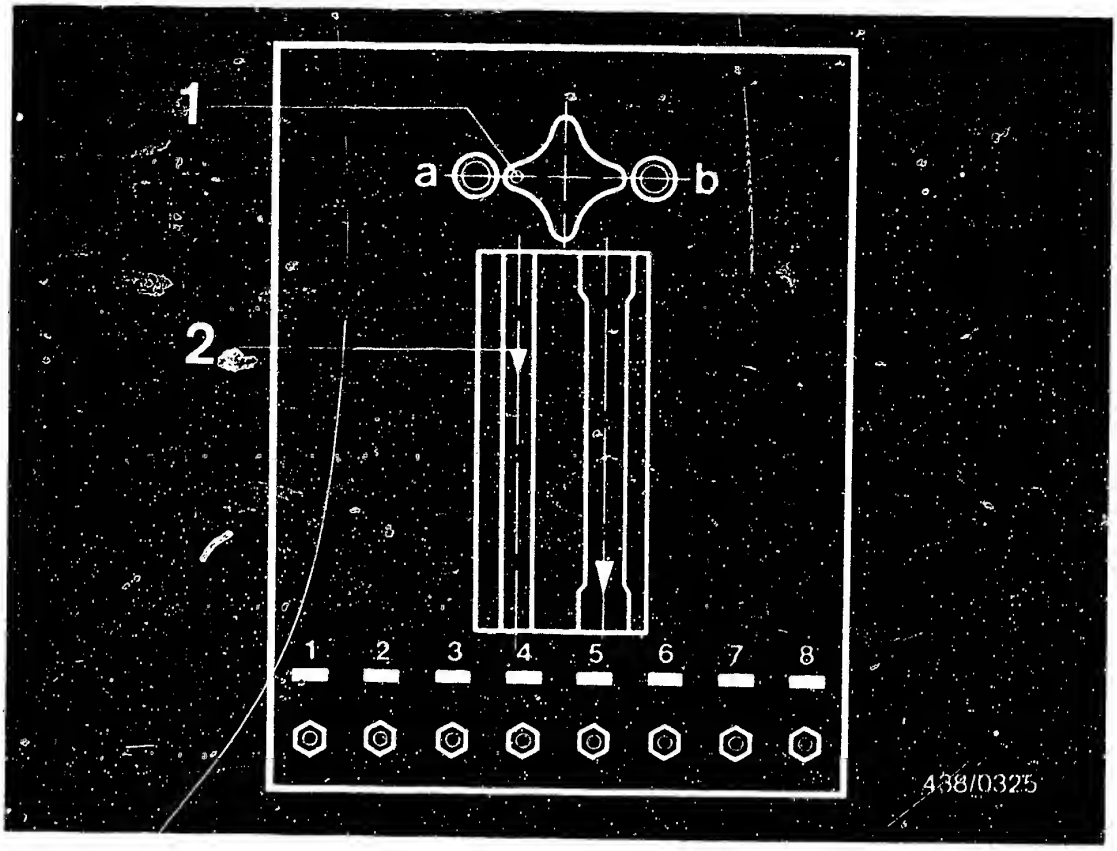


1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

18.5 Testing

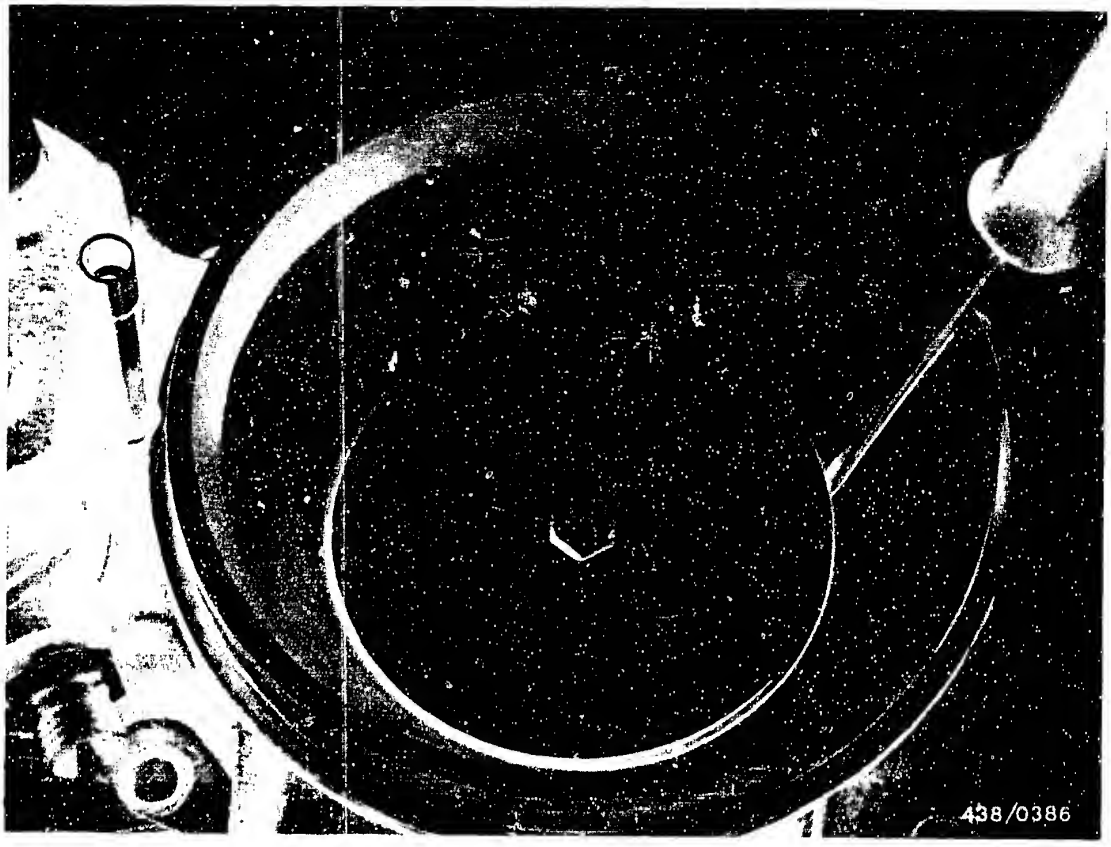
The flow comparison measurement is made in the idle, part-load and full-load ranges.
The small rotameter tube is to be used for the idle measurement (white dot to the left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to the right).



1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2). On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This may take 20 ... 30 seconds in the case of small deliveries.



The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.

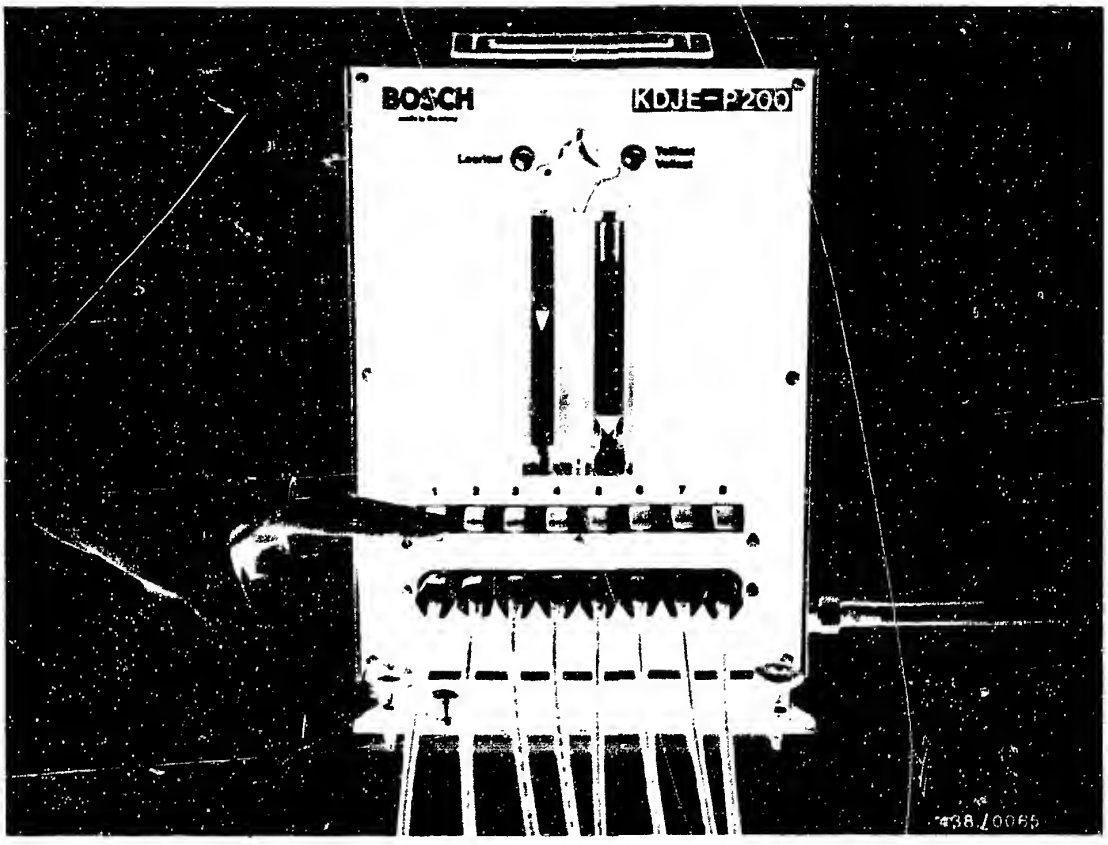
Comparative measurement of fuel deliveries from outlets	Setting point	Max. allowable delivery
Idle	6.0 cm^3/min	6.8 cm^3/min
Part load	40.0 cm^3/min	44.0 cm^3/min
Full load	160,0 cm^3/min	175,0 cm^3/min

Test procedure

Switch on electric fuel pump by switching on the ignition.

Fixed values are given as the maximum allowable differences in fuel delivery for the individual load ranges.

The "setting point" value always refers to the fuel-distributor outlet with the lowest delivery, i.e. it is necessary first of all to find the outlet with the lowest delivery.



Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correctimg the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

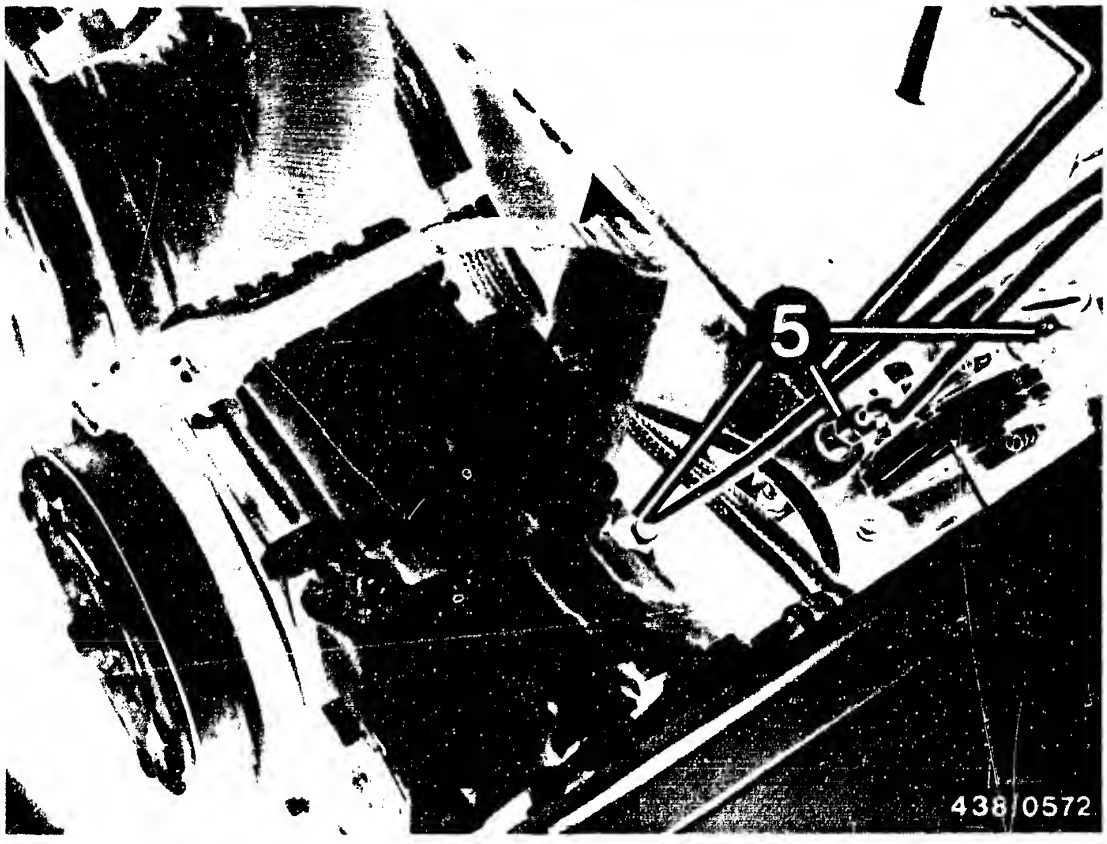
If, in testing, a too large difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.

If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.

Change defective fuel distributor and/or replace defective injection valves.



18.6 Installing the injection valves

Check the rubber cup seals for damage, replacing if necessary (Porsche service part). Wet the rubber cup seals with engine oil and install.

Force the injection valves as far as they will go into the holding sleeves. The rubber cup seal must be below the bead in the holding sleeves.

18.7 Final operations

Mount the rubber dome. Make sure that all lines are correctly laid.

Use a trial run to check that there are no leaks in line connections.

Finally check the idle-speed adjustment; if necessary, correct (Coordinates H 11).

19. Idle-speed adjustment

19.1 Test conditions:

Warm the engine for adjusting the idle speed (oil temperature approx. 80°C).

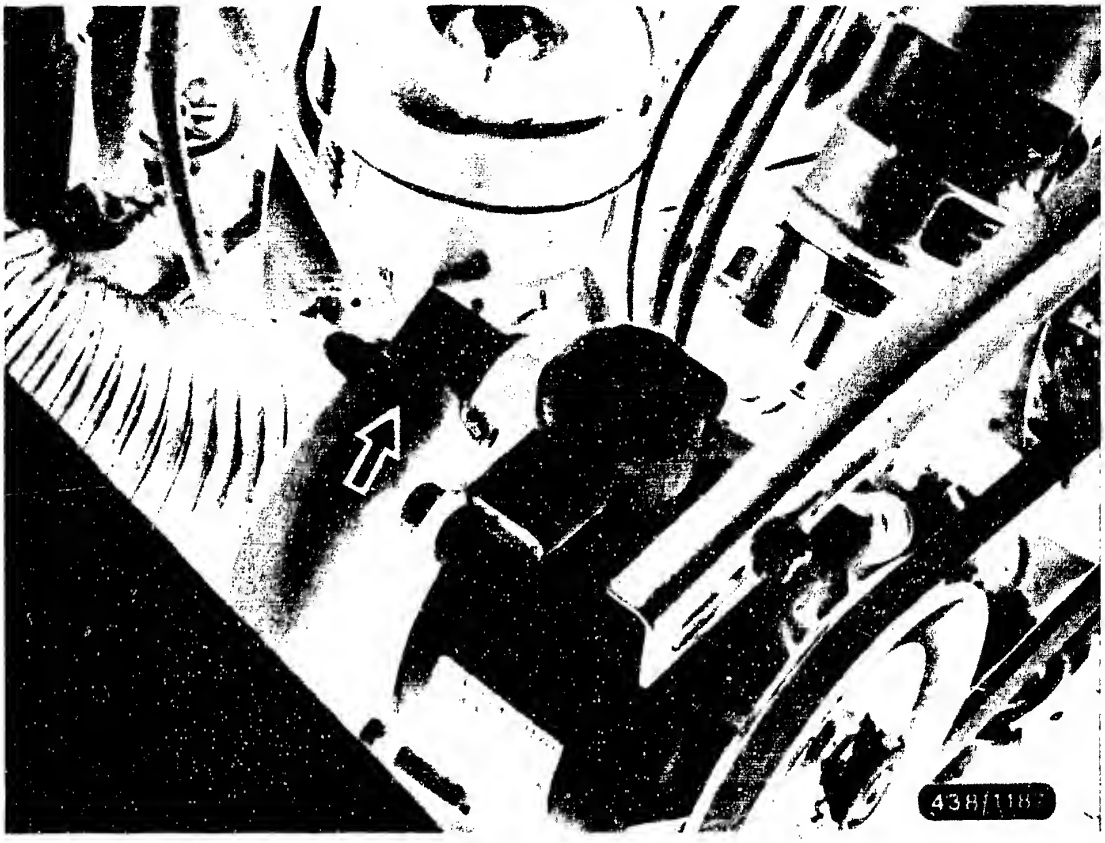
Important note:

If the fuel-injection tubing or injection valves were loosened or removed, the engine should be warmed up under load. The low rate of fuel flow during idling is not always adequate to drive all the air out of the fuel-injection tubing.

The idle speed must not be adjusted when the engine is too hot, e.g. immediately after being raced or after a power measurement on the roller-type test stand.

In vehicles with an air-conditioner, this should be switched off to stabilize the engine speed during idle-speed adjustment.

Rotational-speed measurement with separate tester.



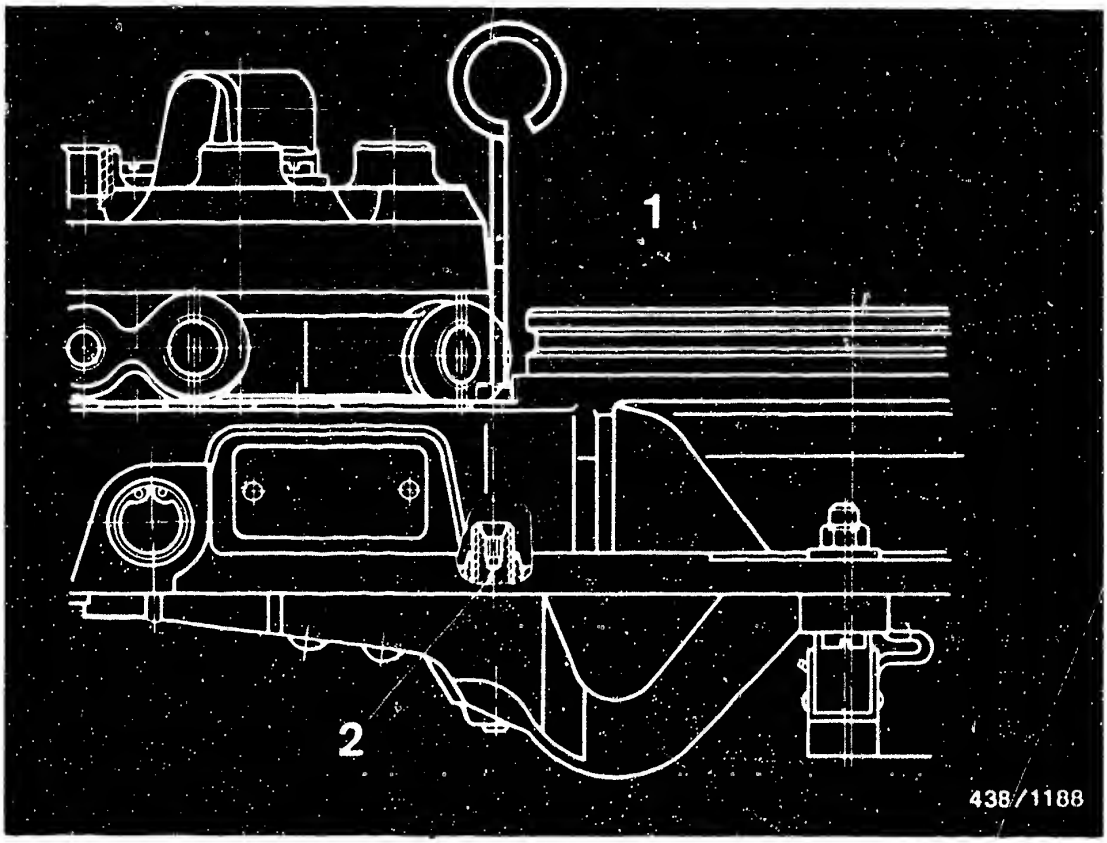
As of the 75 model USA vehicles are equipped with a secondary-air pump. For measuring and adjusting the exhaust emissions at idle speed, remove the pressure hose from the air pump (arrow) and seal off tight with a plug.

1 Idle adjustment:

Idle speed:	850 ... 950 min^{-1}	(manually-shifted transmission)
	900 ...1000 min^{-1}	(Sportomatic)
CO concentration (% by vol.)	73/74 model	1.5 ... 2.0 %
	75 model general	2.0 ... 2.5 %
	USA	1.5 ... 2.0 % *

19.3 Adjustment:

Adjust the idle speed at the bypass screw in the throttle-valve assembly (arrow).



To adjust the CO concentration, remove the wire hook with rubber plug (1) out of the access hole to the idle-mixture-adjusting screw (2) in the air-flow sensor.

Insert adjusting wrench KDEP 1035 through the access hole and into the idle-mixture adjusting screw in the control lever.

Sensitively adjust the idle-mixture-adjusting screw without exerting pressure on the adjusting wrench.

Turning in a clockwise direction = enriches the mixture
Turning in a counterclockwise direction = leans the mixture

Caution:
Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

After every adjustment remove the adjusting wrench and accelerate the engine briefly, so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

19.4 Vacuum limiter:

The vacuum limiter (arrow) is a vacuum-controlled auxiliary-air device which opens only on the overrun. In all other operating conditions the vacuum limiter must be sealed tight.
It can be checked as follows:
Measure the idle speed with the vacuum limiter closed (engine at normal operating temperature). Then switch off the engine.

Remove the hose connection before the throttle valve on the throttle-valve assembly and seal off tightly hose and tailpiece. Start the engine again and measure the idle speed. It must not differ from the previous measurement. If the speed has dropped, the vacuum limiter has a leak.

If it is leaking badly, the idle speed is too high and can no longer be adjusted.
Replace the vacuum limiter if leaking.
If the vacuum limiter has had to be replaced, subsequently check or repeat the idle adjustment (Coordinates H 11).

After-sales Service

Technical Bulletin

43

Continuous Injection System mixture control-unit

VDT-I-438/100 B

Ed. 2 7.1975
Translation of German edition of 1.7.1975

The mixture control unit is still being reported as one defective unit in warranty claims. We wish to point out expressly that the mixture control unit consists of two separate products, the air-flow sensor and the fuel distributor, and that there are separate defect numbers for them in the warranty manual. Please report only the defective product.

Accessory Sets

Various fuel distributors and warm-up regulators have been supplied up to now with pressed-in plug connectors. These will no longer be supplied in future.

	no longer available	Replacement + accessory set
Fuel distributor	0 438 100 002	0 438 100 017
	0 438 100 003	0 438 100 005 + 2 437 001 001
	0 438 100 004	0 438 100 017
Warm-up regulator	0 438 140 002	0 438 140 004 + 1 437 000 000

The accessory sets contain the required number of tailpieces and seal rings.

Please note: the accessory set 2 437 001 000 is delivered included with the fuel distributor 0 438 100 017, and does not therefore need to be ordered separately.

Electric Fuel Pump

In the Technische Mitteilung VDT-BMO 114/1 B and the Service Information sheet VDT-I-740/2-1 B 1st. supplement, we announced that the non-return valve can be replaced on the electric fuel pump 0 580 254 996. We have come to the conclusion from the warranty claims that not enough use is being made of this possibility. Please bear this fact in mind and repair leaky electric fuel pumps before deciding to replace the entire assembly.

In case of inquiry, please contact your authorized representative.

ROBERT BOSCH GMBH
Geschäftsbereich KH
Kundendienst - Technik

BOSCH Geschäftsbereich KH Kundendienst Kfz-Ausrüstung

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10. 1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

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After-sales Service

Technical Bulletin

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 530 254 ..

VDT-I-438/104 En
3.1983
(Replaces Ed. 5.1982)

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal
0 580 254 001	1 587 010 500	---	---
002	500	---	---
0 580 254 003	502	---	---
004	502	---	---
005	502	---	---
006	502	---	---
007	500	---	---
948	005	---	---
949	002	---	---
950	006	---	---
951	006	---	---
952	002	---	---
953	501	---	---
954	002	---	---
956	002	---	---
957	002	---	---
958	002	---	---
959	002	---	---
960	002	---	---
961	002	---	---
962	002	---	---
963	005	---	---

BOSCH
Geschäftsbereich KH Kundendienst Kfz-Ausrüstung

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 964	1 587 010 002	---	---
965	002	---	---
966	002	---	---
967	002	---	---
968	002	---	---
969	002	---	---
970	002	---	---
971	002	---	---
972	002	---	---
973	002	---	---
974	002	---	---
975	003 (4)	---	---
976	004 (3)	---	---
977	004 (3)	---	---
978	1 587 410 901	---	---
979	010 004 (3)	---	---
980	002	---	---
981	002	---	---
982 (1)	003 (4)	---	---
982 (2)	1 587 410 901	---	---
984	010 004 (3)	---	---
985	---	1 583 385 006	1 580 203 002
986	---	386 011	001
987	---	008	001
988	---	008	001
989	---	008	001
990	---	385 004	002
991	---	004	002
992	1 587 010 001	---	---
996	---	386 011	001
998	---	385 004	002
9 580 234 003	002	---	---
005	002	---	---

1 = up to FD 822 2 = from FD 823

3 = Parts set ..003 also possible (delivery-line connection at 90°)

4 = Parts set ..004 also possible (delivery-line connection axial)

After-sales Service

Technical Bulletin

HOT-STARTING PROBLEMS

438

VDT-I-438/105 En
3.1980
Replaces Ed. 2.1980

K-Jetronic

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5.. .

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

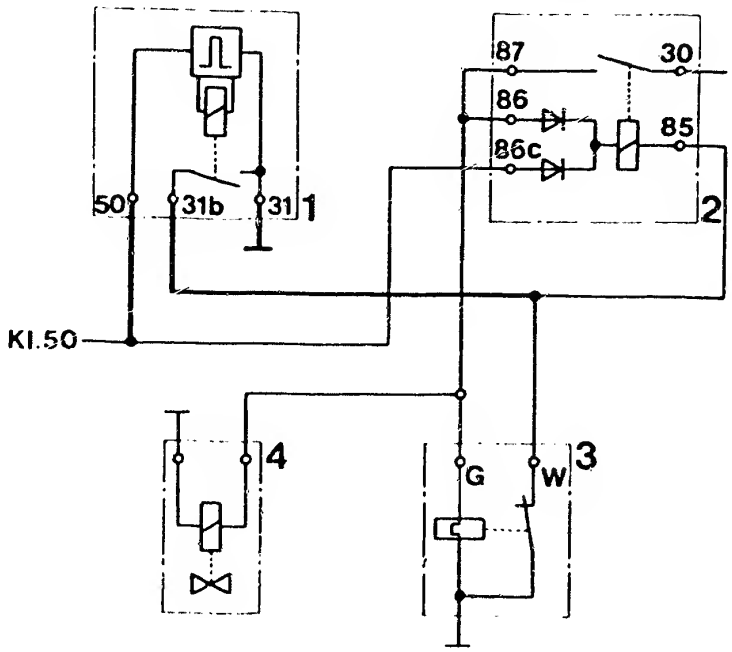
Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely.

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

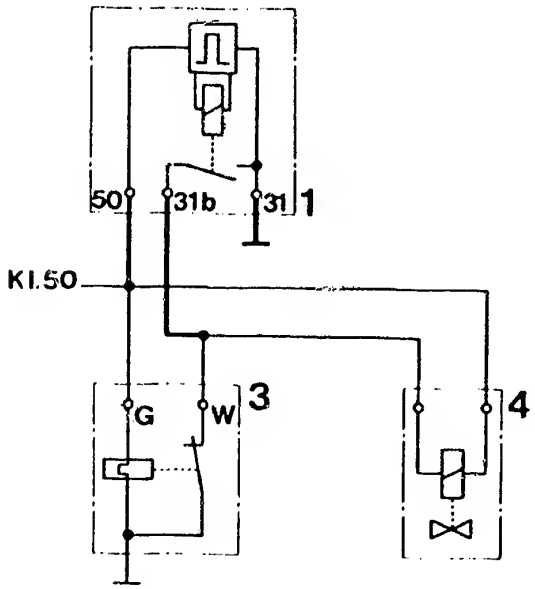
Vehicles with start valve in intake manifold - with open throttle valve,
Vehicles with start valve in idle duct - with closed throttle valve.

BOSCH Geschäftsbereich KH Kundendienst Kfz-Ausrüstung



K-Jetronic system with post-injection relay

1 = Timing relay 0 340 000 003
2 = Post-injection relay
3 = Thermo-time switch
4 = Start valve



K-Jetronic system without post-injection relay

After-sales Service

Motor Vehicle Service Information

EXPORT VEHICLES WITH
EMISSION CONTROL SYSTEMS

VDT-I-Gen. 042 En.
12. 1981

K-Jetronic and L-Jetronic

Export vehicles for countries with stringent exhaust emission regulations are equipped with various emission control systems. To meet the legal requirements, these systems are installed either individually or in combination, depending on the model version.

Emission control system	installed predominantly in export vehicles				
	Sweden	Australia	Canada	USA	Japan
Exhaust-gas recirculation*	●	●	●	(●)	(●)
Secondary-air induction*	●	●	●	(●)	(●)
Secondary-air injection*	●	●	●	(●)	(●)
Catalytic converter*	-	-	-	●	●
Lambda closed-loop control	-	-	-	●	●

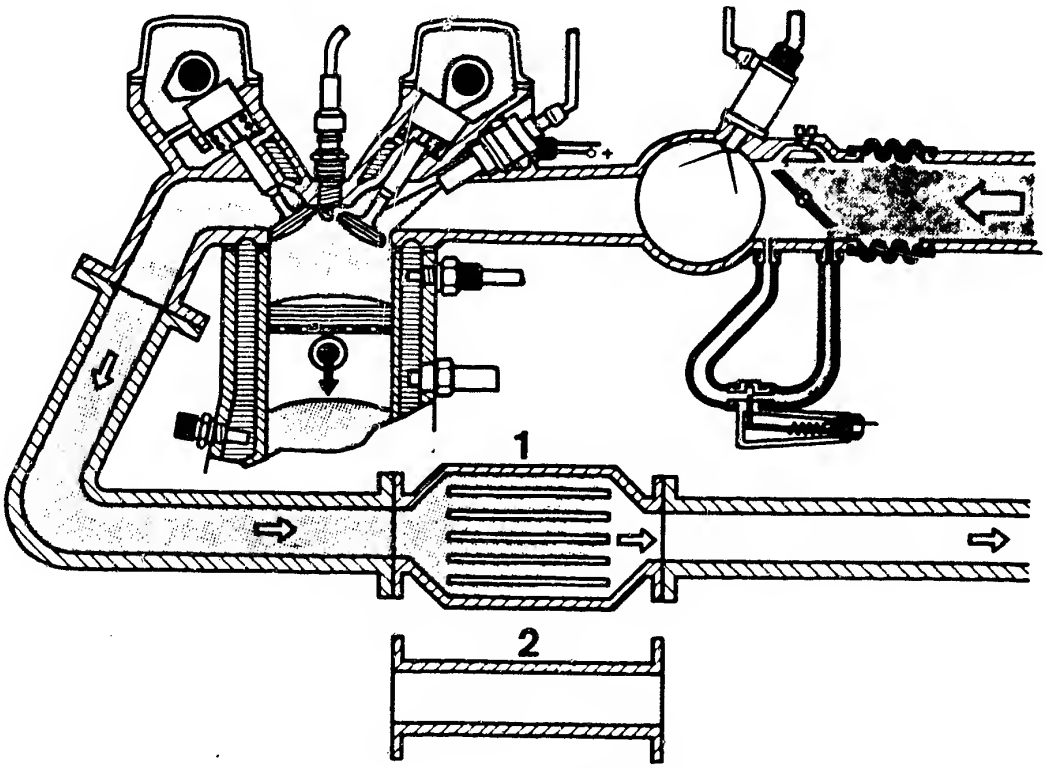
The vehicle-related After-Sales Service Instruction Manuals for the K-Jetronic and L-Jetronic describe the construction, function and operating principle of the emission control systems. The influence of these systems should be borne in mind particularly when adjusting the idle speed and CO concentration.

Export vehicles are sometimes also encountered in countries which do not have particularly stringent exhaust emission legislation. This Service Information publication summarizes the various emission control systems and provides information for the After-Sales Service in countries with exhaust emission legislation which does not require such emission control systems or unleaded fuel.

* Not made by Bosch

BOSCH
Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung

4. Catalytic converter



1 = Catalytic converter 2 = Intermediate pipe

The single-bed catalyst installed in the exhaust system in export vehicles (also with lambda closed-loop control) reduces all three pollutants CO, HC and NOx to a minimum. The catalytic surface triggers chemical reactions of the pollutants, rendering them non-toxic.
Important: Proper operation only possible in conjunction with unleaded fuel (at present only in USA and Japan).

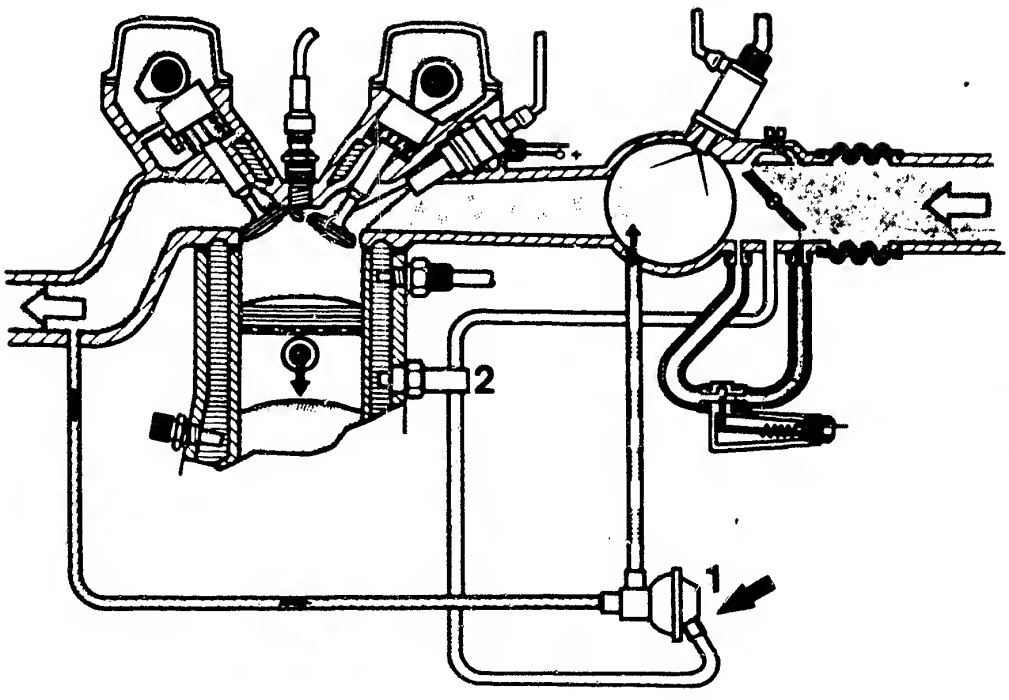
When testing or adjusting the idle speed and the CO concentration, the catalytic converter can be neglected since the exhaust-measuring point is upstream of the catalyst.

Caution!

If the vehicle is operated on leaded fuel (predominantly in countries without stringent exhaust emission legislation) the catalytic converter must be removed. If not removed, the catalytic converter would become clogged up and lead to a reduction in the power output of the engine.

Appropriate intermediate pipes for converting the exhaust system are available from the vehicle manufacturer.

1. Exhaust-gas recirculation (EGR)



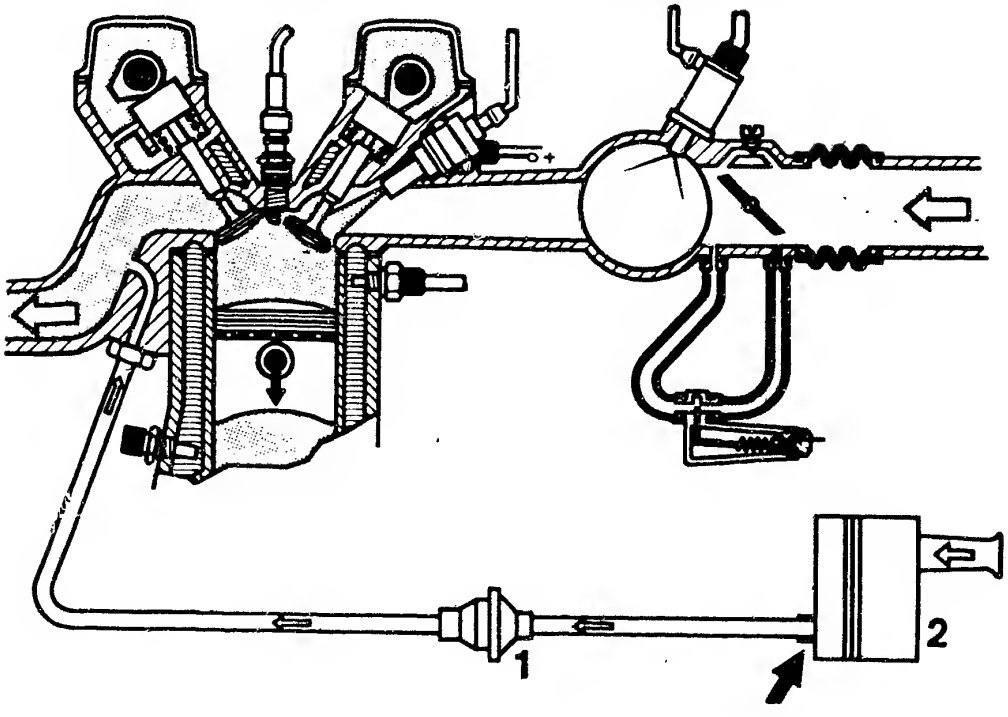
1 = Exhaust-gas recirculation valve 2 = Thermo-valve

Some of the exhaust gas is returned to the intake manifold via a vacuum-controlled exhaust-gas recirculation valve. This recirculation of exhaust gas into the combustion chamber lowers the combustion temperature and reduces the emission of nitrogen oxides (NOx). The thermo-valve and the position of the vacuum tapping port on the throttle-valve assembly ensure that exhaust gas is only recirculated when the engine is warm and only at part load. There is a reduction in engine speed of about 200 min^{-1}. Exhaust-gas recirculation is inoperative at idle, full-load and when the engine is cold.

When testing or adjusting the idle speed and CO concentration, remove and seal off the vacuum control line (arrow) on the exhaust-gas recirculation valve in order to ensure that the exhaust-gas recirculation system is inoperative.

In countries without stringent exhaust emission legislation it is not necessary to shut down the system.

2. Secondary-air induction (e.g. Volvo Pulsair system)



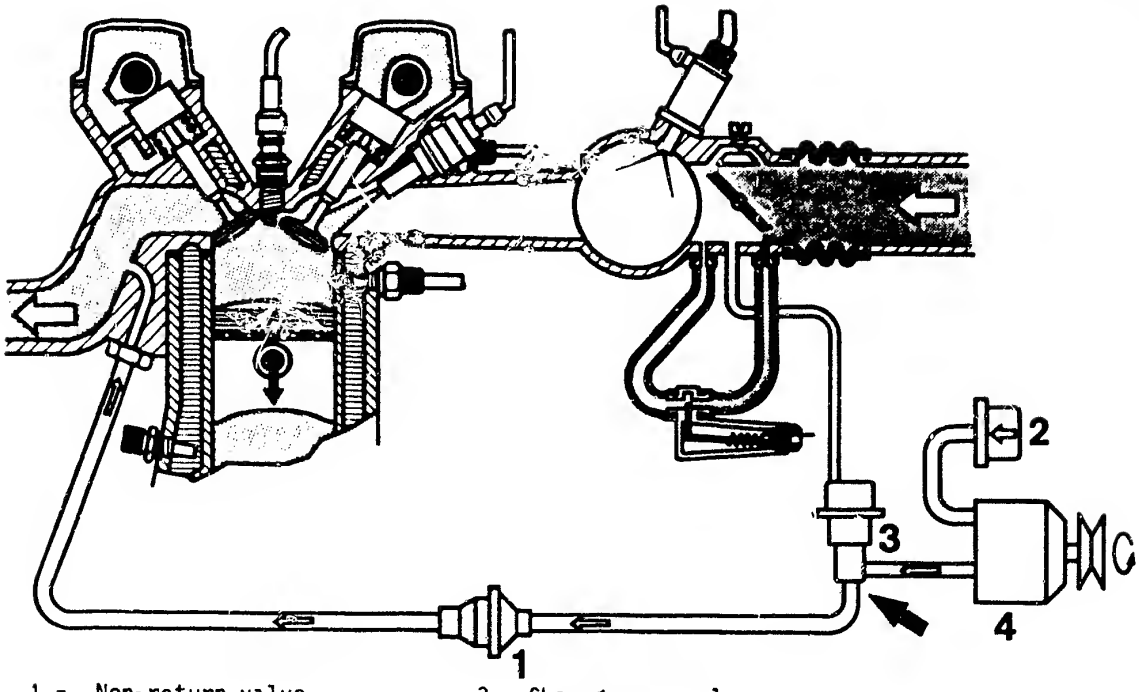
1 = Non-return valve 2 = Air filter

The pulsating alternation between overpressure and depression in the flow of exhaust gas inducts fresh air into the exhaust ports via a non-return valve. Unburned residues of carbon monoxide (CO) and hydrocarbons (HC) are partially after-burned, leading to fewer pollutants in the exhaust gas.

When testing or adjusting the idle speed and the CO concentration, the secondary-air induction system must be rendered inoperative. To do this, remove the hose between the non-return valve and the air filter on the air filter (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air induction system.

3. Secondary-air injection



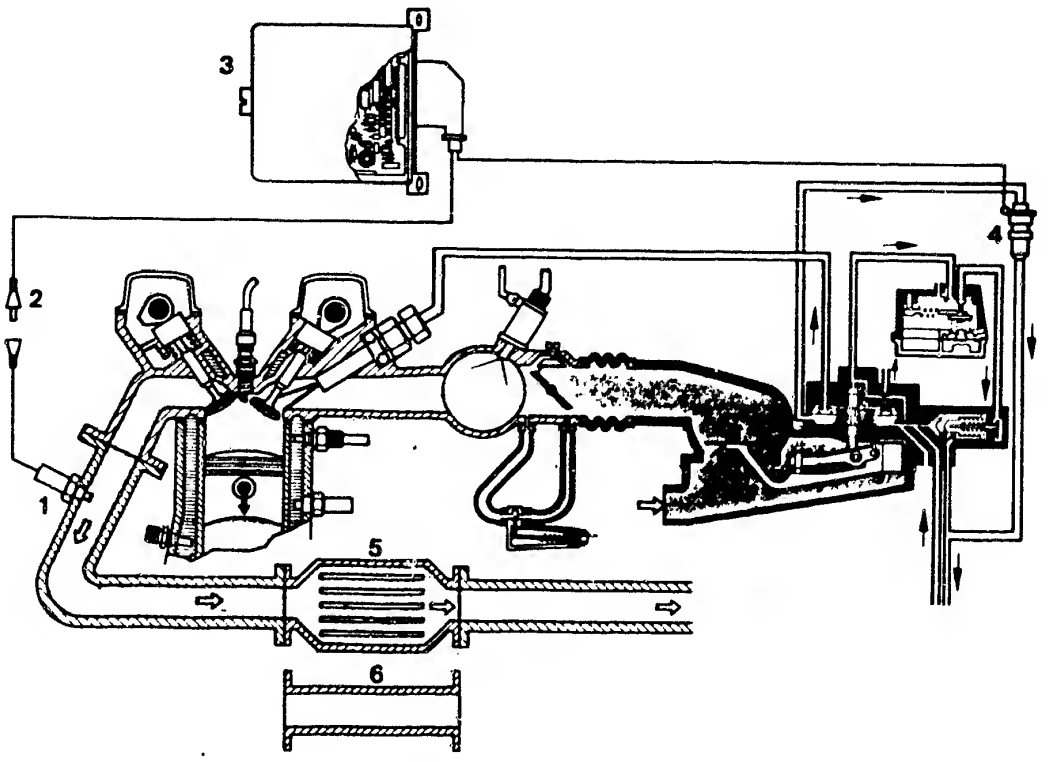
1 = Non-return valve
2 = Air filter
3 = Change-over valve
4 = Air pump

An air pump driven by the engine inducts fresh air through the air filter and forces it via a non-return valve into the exhaust ports. As in the case of secondary-air induction, there is a partial after-burning of the CO and HC residues. This makes the exhaust gas cleaner. A vacuum-controlled change-over valve controls the operation of the secondary-air injection system.

When testing or adjusting the idle speed and the CO concentration, shut down the secondary-air injection system. To do this, remove the hose from the outlet of the change-over valve (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air injection system.

5. Lambda closed-loop control



1 = Lambda sensor
2 = Plug
3 = Control unit
4 = Timing valve
5 = Catalytic converter
6 = Intermediate pipe

Export vehicles for the USA and Japan are equipped with lambda closed-loop control. This additional function of the K-Jetronic or L-Jetronic is not a downstream emission control system, but ensures a low pollutant content in the exhaust gas by means of optimum mixture preparation. Additional exhaust-gas recirculation, secondary-air induction or secondary-air injection is therefore not necessary in most cases. Like the catalytic converter, the lambda sensor (in the exhaust gas) operates only with unleaded fuel.
If the vehicle is operated on leaded fuel, the lambda sensor becomes clogged up and ceases to operate. The control unit detects this and switches from closed-loop to open-loop control. The system then operates on a fixed air-fuel ratio in the same manner as a K-Jetronic or L-Jetronic without lambda-closed-loop control. Before operating on leaded fuel, the lambda sensor should be removed and the installation hole should be closed off with a screw plug M18x1.5 (length of thread max. 8.5 mm). The disconnected plug (2) of the sensor connecting cable should be insulated and fastened to a suitable place on the vehicle body.

Caution!
Under no circumstances must the control unit or the timing valve be shut down on the lambda closed-loop control of the K-Jetronic.
The catalytic converter should be replaced by an intermediate pipe.

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Division KH
After-Sales Service Department
for Training and Technology
(KH/VSK)

After-sales Service

Motor Vehicle Service Information

COLD START - WARM UP
ACCELERATION PROBLEMS

VDT-I-Gen. 051 En
10.1982

in vehicles with Jetronic

Customer complaints

- Starting problems with a cold engine
- Engine bucking during warm up
- Uneven idle (speed fluctuations)
- Engine cuts out during acceleration (flat spot)
- Loss of output

Cause

When the ignition and the Jetronic have been checked and the test specifications given have been reached, a possible reason for the problems quoted could be coke residue on the intake valves.

The carbon residue thus present delays a continuous flow of fuel from the injection valve to the combustion chamber on account of its sponge effect.

As a result of this the air-fuel mixture can in some cases be so lean, that it can no longer be ignited.

Loss of output results from a reduction in the amount of cylinder filling and is caused by a very high coking.

Complex connections between qualities specific to the engine, the engine oil and fuel used, as well as relevant driving cycles (e.g. mainly short stretches) can cause such coking on the intake valves.

Remedy

Dismantle the intake valves and remove the deposits.

Please note

Various vehicle manufacturers are working at the moment on other measures, such as cleaning with additives. Results of these tests are not yet available.

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After-sales Service

Motor Vehicle Service Information

LIQUID PETROLEUM GAS (AUTOGAS) SYSTEMS AND VEHICLES WITH K-JETRONIC

VDT-I-Gen. 052 En
10.1982

Fitting at a later stage

Vehicles with K or L-Jetronic are not suitable for fitting at a later stage with liquid petroleum gas (LPG) systems.

Numerous problems can occur, such as:

- Reduction of fuel flow through the injection valves due to deposits
- Stiffness or blocking of the K-Jetronic fuel distributor plunger (due to gumming or similar) in the course of time with "gas only operation."
- Increased danger of backfiring in the intake manifold (burbling) and thereby damage to the air-flow sensor.

Guarantee

Guarantee claims for failed Jetronic components from vehicles thus converted will not be accepted.

Conversion to liquid gas operation is made at the risk of the vehicle owner.

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